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Province of British Columbia
Ministry of Environment
Annual Report, 1988/89

Honourable John Reynolds
Minister of Environment

Richard L. Dalon
Deputy Minister of Environment

Annual Report, 1988/89

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To His Honour
The Lieutenant Governor of the
Province of British Columbia

May It Please Your Honour:

Herewith I beg respectfully to submit the annual report of the Province of British Columbia Ministry of Environment for the period April 1, 1988 to March 31, 1989.

John Reynolds
Minister of Environment

The Honourable John Reynolds
Minister of Environment

Sir:

I have the honour to submit the annual report of the British Columbia Ministry of Environment for the period ended March 31, 1989.

Richard L. Dalon
Deputy Minister
of Environment

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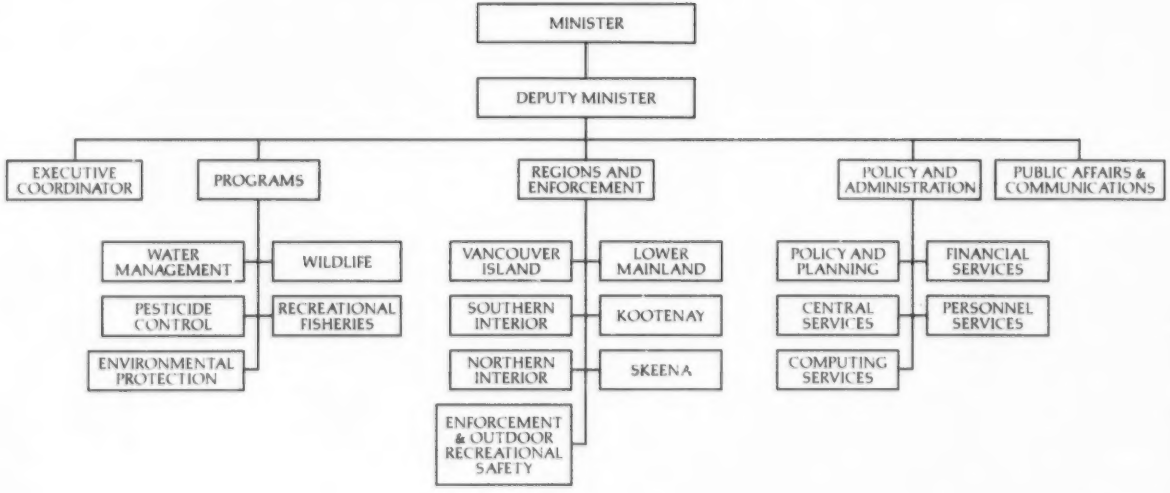
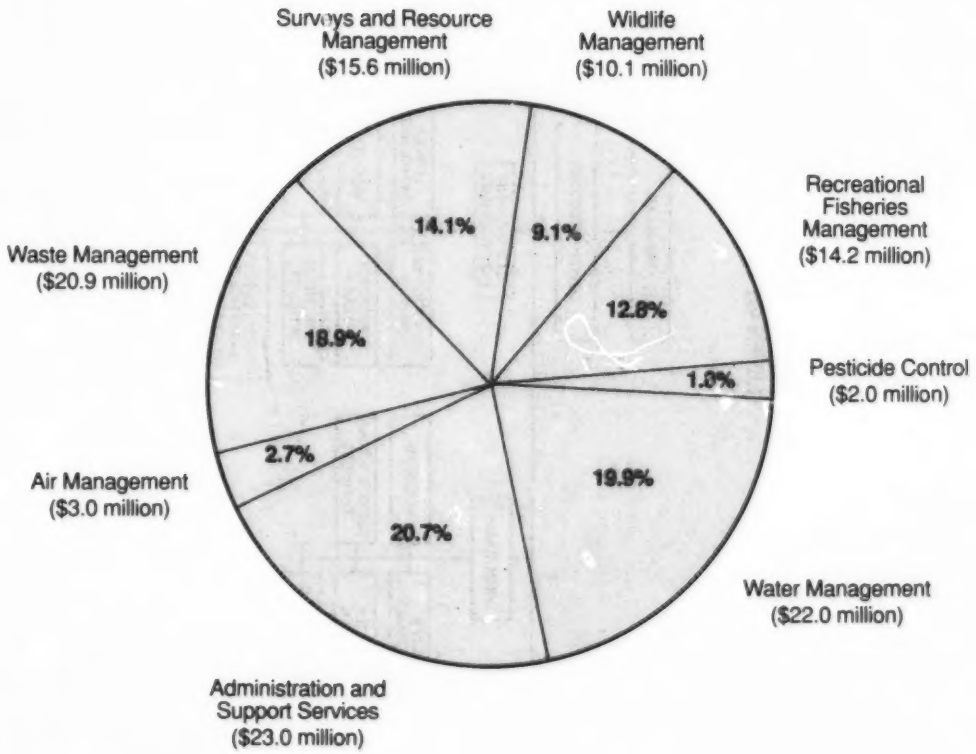


April 1, 1989

MINISTRY BUDGET, 1988/89



DEPUTY MINISTER'S SUMMARY

This report for the fiscal year ending March 31, 1989, the year in which Environment and Parks became two separate ministries, records the work of the Ministry of Environment.

The Ministry of Environment's mandate during this period was to maintain environmental quality through the management and protection of the land, water, air, and living resources of the province. Within this mandate, the individual programs and branches of the Ministry fulfilled their objectives through the activities outlined in this report.

This year will be widely remembered in British Columbia for two oil spills from ocean tankers. In January 1989, an accident off the Washington coast involving the oil barge *Nestucca* created an oil slick that came ashore on the west coast of Vancouver Island. Among many provincial actions in response to the spill was the creation of the Cross-Border Task Force on Oil Spills, whose task was to develop a system of co-ordinated responses to such emergencies. This Task Force, co-chaired by the Province, eventually involved British Columbia and all four U.S. west coast states.

In March 1989, on the very day of the Task Force's first meeting, came word of a second, much worse, spill with the grounding of the tanker *Exxon Valdez* on the coast of Alaska. Task Force personnel immediately set off to examine the site. Although none of the oil reached provincial coastlines, important lessons were learned for the future.

These events contributed to a growing public awareness of environmental issues in British Columbia which in 1988/89 drew the Ministry more and more into the public eye. The increasing public attention to matters within the Ministry's area of responsibility resulted in unprecedented demands on Ministry services, placing greater importance than ever on comprehensive strategic planning in major areas. This proactive stance in turn reinforced the significance of issues of sustainability, of reassessing mandates, and of public consultation in deciding basic strategic questions. With these changes, the Ministry was keeping pace with new trends in environmental thinking appearing throughout society generally.

One prominent example of this new attitude in 1988/89 was the Task Force on Solid Waste. While municipal garbage is being generated in ever-greater quantities, disposal space in the province is vanishing rapidly. The Task Force undertook extensive public consultation to identify and evaluate options for long-term solutions.

Another significant step in 1988/89 was the appointment of the Task Force on Environment and Economy. Evidence that existing patterns of economic development are compromising the global environment and limiting the resources available to future generations led during the 1980s to a national — and international — commitment to the concept of sustainable development. The Task Force was asked to block out British Columbia's future contribution to that national goal. During the year, it too undertook extensive public consultation in its inquiry.

By the end of the year, it was apparent that the Ministry's new course would continue and strengthen in the year to come.

Water Management Program

The Water Management Program manages the province's water resources for the benefit of British Columbians.

In 1988/89, the Program's aims and the activities that supported them could be grouped in three broad areas:

- Water supply management: to ensure adequate water supply in the province by monitoring water supply capability, by allocating and regulating water resources among multiple users, by regulating water utilities, and by providing technical support on water-related projects to other ministries.
- Water quality management: to ensure a high quality of water resources by setting standards, monitoring, and dealing with identified problems, including nuisance vegetation.
- Flood and erosion control: to reduce and prevent damage and loss of life from floods and erosion by runoff forecasting, identification of flood-prone areas and control of their development, drainage, channel clearing, and construction and maintenance of dykes and dams.

In 1988/89, the highlights of activities in support of these aims were as follows:

Water Supply Management

Water supply management in the Ministry has three main aspects: monitoring water supply capability and assisting supply projects, monitoring hydroelectric development and reservoir management, and water allocation and regulation.

Monitoring water supply capability and assisting supply projects

The year saw a number of accomplishments in water supply monitoring and project assistance:

Monitoring water supply capability:

For measuring surface water levels, nine new hydrometric stations were added to bring the total number of stations operated under a federal/provincial agreement to 583.

Snow surveys are undertaken because of the importance of snow accumulations in determining annual water levels in the province. During and before the snowmelt period, 1,267 manual snow surveys were conducted at 264 stations and the results published in the Snow Survey Bulletin. Information was also produced by 19 automated snow survey stations, five of which were operated by Water Management staff. Five new survey stations were also built by B.C. Hydro.

Groundwater monitoring was also extensive. In 1988/89, 1,073 water well records were collected from well-drilling contractors, and a total of 2,732 water well records were processed. Water level fluctuations were monitored regularly at 145 observation wells across the province.

An average of more than 10 general enquiries a day (2,682 in all) for groundwater information were answered. Moreover, 12 assessments were completed of cases involving groundwater supply potential and use conflicts, in addition to seven well-capacity reviews for municipal water supplies.

Water supply projects:

The Water Management Branch assists the development of water supply projects through feasibility studies and project management.

- *Feasibility studies*

  Substantial funds are available from a federal-provincial agreement for irrigation, drainage, soil conservation, and water conservation projects. These funds are administered by the Ministry of Agriculture and Fisheries, which requests the Water Management Branch to conduct feasibility studies of water supply and irrigation projects.

  In 1988/89, four applications for feasibility studies were received, bringing to 48 the total number of projects referred for study. In 1988/89, preliminary engineering assessments were completed for 15 of these projects and terms of reference for detailed feasibility studies were completed for two projects.

- *Project management*

  In 1988/89 a further eight of these projects were approved for construction, bringing the total number of approved projects to 17, with an estimated total value of $5.1 million. Six of

the 17 were completed during 1988/89 at a cost of $1.1 million.

While final design and construction of these projects was largely carried out by contractors, the Branch provided project management and monitoring.

Monitoring hydroelectric development and reservoir management

Large-scale water supply issues in lakes and river systems are also dealt with by the Water Management Branch. In 1988/89, sites of concern included several large hydroelectric facilities, the Okanagan Main-Stem system, the Nicola Lake Dam, and the Vedder River Floodway.

Monitoring large hydroelectric facilities:

Accomplishments of 1988/89 associated with hydroelectric reservoirs include the following:

- Under a special agreement with the City of Seattle monitored by the Water Management Program, the water level in Seven Mile Reservoir was raised, extending the reservoir into Washington State, to increase generation potential.
- A review of expected inflows and operating methods at Williston Lake Reservoir monitored by the Water Management Program reduced the maximum spill from Bennett dam and thus allowed a reduction in required spillway capacity at the proposed Site C project downstream on the Peace River.
- An agreement was finalized between B.C. Hydro and the City of Nelson awarding the city additional flows in the Kootenay River.

The Branch also worked closely with B.C. Hydro and the Alberta government to reduce the threat of flooding in the town of Peace River resulting from water releases from Peace River dams in the fall during river ice build-up, and in the spring during ice break-up.

Regulation of the Okanagan Main-Stem System:

Low water in Okanagan Lake was a problem for the second year in a row. Though all licensed users on the main stem had sufficient water, because the remaining flows released to the river were significantly reduced, careful co-ordination with fisheries authorities was needed to optimize fish migration, spawning, and incubation.

The new Zosel Dam in Washington (jointly funded by British Columbia and Washington State) was completed. The dam controls the level of Osoyoos Lake. Close liaison between State and Province was successful in allowing storage of water in early summer and close control of lake and downstream discharge levels.

Nicola Lake Dam:

Dredging of the main channel of Nicola Lake was completed in 1988. Despite below-average runoff, the reservoir filled, and releases for irrigation water and fisheries resource flows were maintained. The reservoir was kept filled during the winter of 1988/89 because of the below-average snowpack, so it was not possible to undertake lakeshore works such as extensions of boat launch ramps and lowering water supply intakes.

Vedder River Floodway:

The area between the flood control dykes is administered by the Vedder River Management Committee, which met in January 1989. Gravel build-up was monitored and examined. While no gravel removal was necessary at the time, river sedimentation continues, as will monitoring.

Water allocation and regulation

The Water Management Branch licences all withdrawals of surface water for distribution and use, regulates the operations of privately owned water systems that supply water to the public, and provides public health engineering expertise.

Water licences:

In British Columbia, a licence is needed to take surface water from a lake or watercourse of any kind. In 1988/89, the first of a series of changes was introduced to make it easier to apply for a water licence. As of July 1988, a water licence application could be filed in any Ministry of Environment or Government Agent office. Procedures for posting and serving notice of the application were also simplified. Such streamlining will continue in future.

As of March 31, 1989, there were 38,993 active water licences in B.C., an increase of 831 from a year earlier. During the year, 1,365 licences were granted, up 13 per cent on the year before, while 534 licences were abandoned, cancelled, or replaced — down by 45 per cent from the year before.

Regional offices adjudicated 982 approval applications under Section 7 of the Water Act, while the Comptroller of Water Rights heard 12 appeals from orders of engineers and 13 appeals from licensing decisions of regional water managers.

Regulation of water utilities:

A privately owned water system to supply water to the public for money must be authorized by a Certificate of Public Convenience and Necessity issued by the Comptroller of Water Rights. In 1988/89, 32 applications for such certificates were received, while 38 new or amended certificates were issued. In addition the Comptroller issued 72 orders of various kinds and accepted 22 new or amended water rate schedules.

Public health engineering:

The Program's Public Health Engineers, acting as well on behalf of the Ministry of Health, must approve plans for waterworks systems with two or more connections, for public swimming pools, and for prefabricated septic tanks. In 1988/89, 595 waterworks certificates, 106 swimming pool certificates, and 12 septic tank certificates were issued.

The Public Health Engineers also provide consultation to local Medical Health Officers and Regional Health Inspectors. In 1988/89, 545 consultations were undertaken.

Water Quality Management

Water quality management in 1988/89 involved a systematic approach to the encouragement of water quality and the removal of nuisance vegetation.

Encouragement of water quality

Water quality standards and monitoring programs helped maintain quality, and actions were taken on several identified problems.

Setting standards:

In 1988/89, a major activity was further development of water quality criteria and objectives. Water quality *criteria* are safe concentrations of selected contaminants in water for various types of human or natural exposure. For a given body of water with specific characteristics and uses, these criteria are translated into water quality *objectives*, which are concentration levels aimed to protect the most sensitive users. These objectives establish a standard against which the water quality at a particular site can be measured and used to guide waste and water management.

In 1988/89, criteria were issued for two contaminants, bringing the total so far to nine criteria, and water quality objectives were issued for three bodies of water, raising the total to 24 water bodies.

Monitoring surface water quality:

Comprehensive monitoring was done for the first time in 1987, and a report was published in 1988/89 on the attainment of water quality objectives in that first year.

The Canada/British Columbia Water Quality Monitoring Agreement was in its third year in 1988/89. The agreement provides for cost-sharing of monitoring at 95 stations throughout B.C. to obtain long-term trends. Reports on trends will not begin until after at least five years of operation.

Six lakes in the Lower Mainland and southern Vancouver Island are also being monitored for the effects of acid precipitation.

Monitoring ground water quality:

In 1988/89, the groundwater monitoring program researched and contributed to 24 environmental assessment studies for major developments and produced 16 groundwater protection studies associated with natural phenomena, waste disposal, and accidental spills.

Sampling was also done at 42 wells in the Langley-Abbotsford, Osoyoos, and Cowichan Estuary areas, and five reports were completed.

Specific problems:

Particular water quality issues were also examined during the year. These included assessments of water quality deterioration in lakes and rivers, advice on corrective measures, reviews of municipal waste management plans, predictions of impact of mining developments on surface water, analyses of impact of soil erosion on water quality, and effects of nutrient leaching on farmland.

An Integrated Watershed Management Plan was completed for Norrish Creek, near Mission, an area with critical multiple resource use issues. Similar plans were being prepared for six other watersheds.

Divers from the Dam Safety Unit conducted nine underwater surveys of waste disposal facilities and provided reports to regional waste managers.

Removal of nuisance vegetation

Increasing efforts were made to control the infestation of Eurasian water milfoil, a species of nuisance vegetation which not only interferes with shoreline recreational use but also depletes fish habitat and food resources. In 1988/89, the

provincial government contributed $412,500 for milfoil control in 17 lakes and rivers under cost-shared programs with local municipalities (funding split 75 per cent provincial, 25 per cent local). Treatments included harvesting, rototilling, cultivating, and bottom barrier techniques.

Public information and surveillance activities continued in 1988/89. Two new infestations were found, in Swalwell Lake in north Okanagan and in Brannen Lake on Vancouver Island, both probably the result of unwitting introductions by boaters. These small infestations were controlled by divers and bottom barriers.

The effects of fish farms on marine water quality from both fish food and fecal matter were further investigated during the year. The Environmental Monitoring Program for finfish aquaculture was issued early in 1989, while further research was undertaken on the relationships of phytoplankton and sedimentation to fish farming.

Flood and Erosion Control

The Branch's actions to reduce and prevent damage and loss of life from floods and erosion involved several aspects: runoff forecasting; floodplain mapping and designation; projects for drainage, channel clearing, and river protection; and maintenance of dykes and dams.

Runoff forecasting

Forecasters use data on snow accumulation from snow survey and meteorological stations.

Runoff forecasts for the spring and summer snowmelt periods are made for all major river basins in the province. Data are entered in computer models to make short-term (up to five-day) predictions of water levels and flow rates at specified locations during peak runoff periods.

In 1988/89, a below-normal snowpack and moderate conditions during the snowmelt period resulted in subnormal peak flows and no flood damage. The flood warning system for the Squamish River was used in the fall of 1988, but the weather did not create damaging events.

Floodplain mapping and planning

The Branch is extensively involved in determining which areas are prone to flooding and in evaluating proposed development plans and zoning bylaws for floodproofing effectiveness. In 1988/89 the Branch reviewed 1,143 local regulations and plans and 1,159 proposed subdivisions.

The mapping of flood-prone areas is carried out under a cost-shared federal/provincial agreement.

The floodplain mapping program involves aerial photo interpretation, ground and river surveys, and computer modelling of potentially flooded areas. In 1988/89 these activities occurred in 15 areas in the province. Recommendations for floodplain designation are then made after consideration by a steering committee, which also gives a final review to completed projects. In 1988/89, floodplain designations for three river reaches covering 31 map sheets and four river reaches covering 29 map sheets were prepared for final review.

Drainage, channel clearing, and river protection projects

As with water supply and irrigation project proposals, the Branch receives applications for drainage projects to be financed under ARDSA (the Canada/British Columbia Agri-Food Regional Development Subsidiary Agreement). In 1988/89, two new proposals were received to bring the total number of applications to 30, of which, after rejections and deferrals, 17 proposals with an estimated total cost of $16 million remain active. In 1988/89, following feasibility studies, six projects with a total value of $10 million were approved for construction.

Many requests for assistance were received for channel clearing and river protection projects. Some 19 projects were completed at a cost of $472,000, of which local landowners and municipalities contributed 22 per cent. In addition, staff participated in Provincial Emergency Program restoration work in the Terrace-Smithers area amounting to $231,000.

Special investigations were conducted on coastal, landslide, and flood problems throughout the province. Three larger studies were completed in 1988/89 on beach erosion at Parksville, flooding at Lakelse Lake, and floodplain controls at Harrison Hot Springs.

The Fraser River Flood Control program, carried out under a longstanding federal/provincial cost-sharing agreement, in 1988/89 spent $4.7 million to provide dyke protection in the Lower Fraser Valley. Ongoing projects include Pitt Meadows, Coquitlam River, Glen Valley, Delta, and Chilliwack. Total expenditure since 1968 has been $134.5 million.

Maintenance of dykes and dams

The Inspector of Dykes is responsible for the safety, proper maintenance, and operation of all public dykes in the province. In 1988/89, inspections were carried out on 257 km of dykes, and 83 requests for changes to dykes were investigated. Dyke improvements in the Colebrook and Trethewey-Edge districts were designed and supervised.

A review of dyke maintenance practices was conducted and the results were published in a report: "Dyke Maintenance and Environmental Concerns".

The Provincial Dam Safety Program covers more than 2,000 storage and diversion works in the province, of which 150 are classed as major dams. In 1988/89, the Branch conducted 77 regular and followup inspections of these major dams, while regional staff inspected 380 minor dams. In addition, special instruments were used to monitor the performance of 18 high-hazard dams, and underwater inspections by divers were carried out at 37 installations.

Some dams may fall short of current design standards, especially for spillway capacity and earthquake resistance. Extensive rehabilitation was completed at the John Hart Dam and was in progress at the Jordan River Diversion Dam. Studies indicated that remedial works for greater earthquake resistance will be needed at several dams of the Greater Victoria Water District. The Wahleach Hydroelectric Project was closed down when a ruptured tunnel created a landslide risk in the Fraser Valley. Inspectors found a severely eroded conduit at the Jump Creek Dam in the Nanaimo Water District, which was repaired.

Owners of major dams have been required to prepare maintenance and operating manuals. These manuals are used on site at times of staff turnover or when operating staff are unavailable in an emergency. They are for use as well by emergency preparedness analysts considering responses to dam failures. By the end of the year, there were 60 manuals in place.

REVENUE — WATER LICENSING FEES AND RENTALS

	Year ended Mar. 31, 1985	Year ended Mar. 31, 1986	Year ended Mar. 31, 1987	Year ended Mar. 31, 1988	Year ended Mar. 31, 1989
	$	$	$	$	$
Application Fees	127,090	138,320	113,752	219,265	359,826
Power	193,623,612	220,183,055	228,195,721	222,476,346	250,798,230
Local Authority	539,039	570,117	633,794	671,228	737,222
Other Rental	1,144,313	1,269,289	1,129,390	1,460,396	1,212,925
Interest	143	—	—	—	—
TOTAL REVENUE	195,434,197	222,160,781	230,072,657	225,827,235	253,108,203

Note: — Power revenue is that received from public utilities and other major operators. Small private developments are included under other rental.
— Local Authority revenue is that received from those agencies supplying water for waterworks or irrigation purposes to their residents. Revenue from private water utilities and individual irrigation users is included under other rental.
— Other rental includes charges noted above plus rentals assessed for industrial, mining, domestic, storage and other purposes and for permits to occupy Crown land.
— Power rentals were subject to annual indexing until 1985.
— Interest charged on overdue accounts only on January 1, 1984.
— Revenue from Other Rental and Application Fees for year ending Mar. 31, 1988 reflects revised tariff approved July, 1987.

Number of active Water Licences: as of March 31, 1985 36,758
1986 37,487
1987 37,963
1988 38,162
1989 38,540

Waste Management Program

The Waste Management Program aims to reduce and control the introduction of polluting substances into the environment in British Columbia. This very broad mandate encompasses the nature and effects of releases into the air, water, or land of all types of waste, gaseous, liquid, and solid. Prominent sources of concern include municipal sewage and solid waste, industrial liquid and gaseous discharges, spills and hazardous wastes.

Releases of waste substances into the environment are often classified as being of two types, known as point and non-point sources. Point sources, such as smoke stacks or sewage outfalls, lend themselves to technical remedies and discharge permits. Non-point sources, such as urban storm runoff or discharges from agricultural or industrial land, are just as stressful to the environment but more difficult to control. The latter are best addressed by such methods as waste management planning and regulations reflecting codes of good practice. All these strategies are being pursued by the Waste Management Program.

The aims of the Waste Management Program and the activities and accomplishments in pursuing them in 1988/89 could be grouped in four areas:

- Discharge monitoring and control: to reduce polluting discharges to air, water, or land by establishing mandatory source controls and systems of compliance monitoring.
- Waste management plans: to establish a basis for long-term attainment of objectives by encouraging the development of comprehensive waste management plans.
- Special waste control: to minimize the introduction of hazardous waste substances into the environment by developing a system of tracking and managing such wastes.
- Water quality objectives: to establish accepted levels of environmental quality by developing (in conjunction with the Water Management Program) criteria and objectives for contaminants and by monitoring for these contaminants.

Discharge Monitoring and Control

To reduce the levels of environmental contamination, the Waste Management Program uses a system of enforcement based on discharge permits and intensive surveillance monitoring.

Discharge permits and compliance monitoring

The Waste Management Program issues permits that allow point-source discharges of all kinds to air, water, and land. Each permit specifies the technologies to be used to reduce or ameliorate contaminant releases and sets limits on the concentrations and quantities that may be released to the environment. Ensuring compliance with these conditions requires regular monitoring of discharges.

The permit holder is responsible for the operation of the in-plant control systems and for regular monitoring to see that discharges comply with the permitted limits. During the course of Ministry inspections, audit samples are collected for independent analysis at the expense of the permit holder. In 1988/89, B.C. Research Corporation was appointed by the Ministry to undertake this auditing. The Ministry also carries out environmental surveillance monitoring in the vicinity of all major discharges. In 1988/89, the Ministry's own laboratory was sold to Zenon Environmental Inc., whose services were retained on a contract basis for Ministry analytical work.

In the Ministry, a quality control group was assigned to oversee the methods and analytical techniques used by all the laboratories — permittee and independent — participating in the monitoring activities.

Enforcement strategy

In 1988/89, the Ministry further developed its compliance rating system, which divides the 3100 active discharge permits into four classes based on compliance status and environmental risk. About 325 permits were classed as having significant, actual, or potential environmental impact. At any one time about one-third of these are in non-compliance and thus placed in Class 1 for priority investigation and enforcement. Of the remaining 2,775 permits of lesser environmental concern, about 10 per cent are in non-compliance at any given time and are placed in Class 3 for immediate attention.

Discharge management

In 1988/89, a number of regulatory initiatives were aimed at management of discharges.

Fossil fuels are widely used in British Columbia for industrial process heating and power generation. The sulphur compounds normally present as impurities in these fuels are oxidized during combustion to create sulphur dioxide, a substance that when released to the atmosphere is a leading contributor to acid rain. On March 15, 1989, the government introduced the Sulphur Content of Fuel Regulation, which limited the sulphur content of fossil fuels burned in B.C. to 1.1 per cent by weight.

The culture of anadromous finfish species in marine net pens is a rapidly growing industry with slightly over one hundred new and existing operators. The main environmental impacts are associated with food scraps, feces and disposal of other related wastes. On December 12, 1988, the government introduced the Aquaculture Waste Control Regulation, giving a code of good practice for aquaculture operations. The regulation exempted smaller marine finfish aquaculture facilities from discharge permit regulations provided the site is registered, incidental wastes are satisfactorily disposed of, and production and monitoring data are provided.

Similar codes are being developed for smaller placer mining and for lumber chemical treating operations whose discharges could affect streams.

Waste Management Plans

Urban growth and the gradual merging of municipal boundaries has provided the impetus to seek collective remedies for common waste management and disposal problems. The encouragement of waste management planning in a regional context is a major focus of Waste Management staff activities.

Liquid waste management planning

In 1988/89, a liquid waste management plan for the Greater Vancouver Regional District reached the first stage with the presentation to the Minister of a report on concepts and options. The report addressed the waste and storm water management methods necessary to protect water quality in rivers, streams, estuaries, and coastal waters. The report gave an initial cost estimate of $1.5 billion for programs to achieve all water quality goals.

In the Okanagan Valley, where watercourses are particularly sensitive to the addition of nutrients, planning and the implementation of approved projects continued in 1988/89 with the addition of $5.8 million to the original $20.2 million in assistance funding to ensure all projects will be completed. Plans have been approved for five communities and are in preparation for another four.

Solid waste management planning

Solid waste disposal moved further towards centre stage in 1988/89. Within ten years, it is estimated, space will be exhausted in 60 per cent of the 236 authorized landfills now operating in the province.

During the year, a task force on solid waste management was established under the chairmanship of James Rabbitt MLA to consider the options available to meet this impending crisis. Public meetings were held around the province and by year's end, the report of the task force was nearly ready for public release.

A similar task force to consider the problem of biomedical waste disposal was also formed in 1988/89, and its report will be released in the coming year as well.

Special Waste Control

Special waste, sometimes called hazardous waste, consists of substances that are toxic or reactive enough to pose a hazard to human health or the environment if they are not handled and disposed of with special procedures and equipment. About 100,000 tonnes of such material is produced annually in British Columbia.

In 1988/89, important initiatives were taken to control the management of special waste in the province:

- The Special Waste Regulation was introduced on April 1, 1988, to provide a system for tracking such materials from the point of origin to point of disposal. During the system's first year, 1,200 individuals and businesses were registered as special waste generators, 320 transporters were licensed to carry special waste, and 12,317 manifests for individual shipments were issued.
- In January 1989, new requirements for packing and storage of PCBs were announced, and some 490 PCB storage sites were identified in the province.
- In March, a category of "historically contaminated area" was established to be

subject to site-by-site remediation requirements. Notable examples of such sites included the Concord Pacific site on the Expo 86 grounds in Vancouver, the Songhees Indian Reserve residential redevelopment in Victoria, and a number of B.C. Hydro substation sites. Remediation work was underway as well at 45 other such sites in the province.

- During the year, nearly 1,500 spills were reported — about twice as many as in previous years. The jump is ascribed mainly to increased awareness of the need for reporting and the proper recovery and disposal of materials.
- The Ministry continued to operate eight special waste storage facilities for the convenience of householders and other minor producers. During the year,160 barrels of packaged chemicals were shipped out of province for disposal, and by arrangement, the RCMP responded to 41 requests to dispose of explosive and reactive materials.
- The proposed site of a special waste management facility at Cache Creek proved unsuitable and was dropped from consideration in 1988/89, requiring the search for a site to continue.

Water Quality Objectives

To control the impact of polluting substances discharged to provincial waterways, limits must be placed on concentrations of contaminants. In 1988/89, in co-operation with the Water Management Program, water quality criteria (applicable to all provincial waters) were prepared for aluminum and microbiological indicators. These were additions to a list of criteria that already included particulate matter, nutrients and algae, cyanides, molybdenum, nitrogen, copper, and lead, prepared in previous years.

The criteria are used in preparing water quality objectives reports for specific watersheds. During the year, reports were prepared for two such areas, Boundary Bay and the Cowichan-Koksilah watershed, which brought the total number of available reports to 22.

Waste Management staff routinely monitor water quality in the vicinity of all major discharges. In addition, water samples for analysis are collected at 90 federal, provincial, and jointly funded sites throughout the province to identify long-term water quality trends.

Recreational Fisheries Program

The Recreational Fisheries Program manages freshwater fish, fish habitat, and sport fishing in British Columbia.

In 1988/89, the Program's aims and supporting activities were in two closely related areas:

- Managing fish and sport fishing: to maintain and improve the stocks of sport fish in lakes, rivers, and streams by licensing anglers, assessing harvests, monitoring fish species, and planting fish.
- Managing habitats: to protect and improve habitats — for both fish and fishermen — by research and development, habitat protection, and habitat improvement activities.

This program guides the work of the Recreational Fisheries Branch and is delivered in the field by the Regional Fish and Wildlife Offices.

Recreational fishing in British Columbia occurs in four sittings, which receive different management practices and levels of effort:

- anadromous streams (the freshwater routes used by species such as steelhead, chinook salmon, and cutthroat trout, which run to the sea but attract anglers while returning to freshwater spawning areas); these waters also contain resident populations of non-anadromous fish.
- small lakes, usually in attractive natural settings, the preference of most anglers, where fish stocks are most desired and most heavily harvested and easily depleted.
- large lakes, often adjacent to heavily settled and industrialized areas, of growing importance to anglers living nearby but whose fish populations and habitat resources remain largely unknown.
- inland streams, many with severely reduced resident fish populations but often suitable for fishery development.

Traditionally, most efforts in both fish stocks management and habitat improvement have been directed towards anadromous streams and small lakes. But large lakes and inland streams are of increasing interest and thus are attracting more and more research and assessment.

Managing Fish and Sport Fishing

Recreational fish stocks are maintained and improved in three ways: by licensing anglers and assessing harvests, monitoring fish species, and culturing and stocking fish.

Licensing and monitoring anglers

To angle for freshwater fish in British Columbia, a licence is required. In 1988/89, nearly 400,000 basic freshwater angling licences were sold, as well as another 57,000 supplementary licences for certain types of fish subject to intensive management. Licences were also issued to 255 angling guides and 204 assistant guides, up from 242 and 136 the previous year.

In part because of increased licence fees, total revenue from freshwater angling licences in 1988/89 was $4.7 million, up sharply from $3.9 million the year before.

Basic freshwater angling licences:

The 395,412 basic angling licences sold in 1988/89 was an increase of 2 per cent over the previous year and 6 per cent above the year before that. As in previous years, nearly 80 per cent of licences were sold to B.C. residents and the remainder divided evenly between other Canadians and non-Canadians.

Supplementary angling licences:

The following supplementary licences were also sold:

- 28,163 steelhead licences.
- 24,967 chinook salmon licences (to keep up to 10 chinook salmon over 50 cm in fork length).
- 3,218 Kootenay Lake rainbow trout licences.
- 578 Dean River special fisheries permits.

The steelhead catch, with 237,594 angler days and 148,859 fish landed, remained high, just below the record level, with hatchery steelhead accounting for about 22 per cent of the catch. The Chilliwack/Vedder river recorded the most steelhead anglers and catches, followed by the Campbell/Quinsam, Cowichan, Bulkley, and Skeena rivers.

Recording angling activity:

Aerial boat counts continue to improve as a method of estimating angling activity on lakes. In this way, 104 lakes in the Cariboo region and 111 lakes in the Okanagan region were enumerated in 1988/89.

Monitoring fish species

In 1988/89, monitoring of fish species occurred mainly in anadromous streams and small lakes, with more limited activity in large lakes and inland streams.

Anadromous streams:

To assess population size and distribution in streams, fish counts can be made by observers with snorkels. Twelve steelhead and five cutthroat trout stream systems were surveyed this way in 1988. Sometimes aerial surveys are possible: such a survey of the Chilko-Chilcotin steelhead run in 1988 showed spawning fish to be only one-third as numerous as the average of the previous five years.

Conditions at sea may often be more important to the survival of anadromous species than freshwater conditions. In particular, interceptions in commercial ocean fisheries directed at other species can substantially affect stocks. For example, a 12 per cent increase in steelhead catch in the Dean River estimated from creel census results is attributed to the commercial fishing industry strike in 1989. Steelhead interception in commercial fisheries continues to dominate the agenda for the Skeena River, where steelhead abundance has declined for three consecutive years. Similar problems exist in the Nass, Stikine, and Taku rivers.

A modified commercial gill net, tested in approaches to the Dean River in 1988/89, would reduce steelhead interceptions by about 70 per cent; but it would also reduce the chum salmon catch by about 30 per cent.

Negotiations continue with the federal Department of Fisheries and Oceans on the issue of steelhead interception.

Small lakes:

In small lakes, fish stocks are primarily estimated from catch information obtained from anglers. Rainbow trout levels are being monitored by aerial boat counts and long-weekend creel census surveys.

Lake inventories provide data on fish species distribution and abundance.

Large lakes:

In large lakes, fish stocks and movements are estimated by tagging or marking and releasing a known number of fish and then surveying the proportion of marked fish in the total catch. Kokanee in Kootenay and Okanagan lakes and Dolly Varden and rainbow trout in Chilko Lake were the subject of substantial tagging and marking programs in 1988/89.

Kokanee in large lakes are being monitored with echosounding and trawling.

Culturing and stocking of fish

All movements and transplants of live fish, whether by government agencies or private individuals must be approved by the Federal/Provincial Transplant Committee. In 1988/89, 556 applications were reviewed (up from 512 the year before), of which 98 per cent were approved.

A Fish Culture Permit is required for raising freshwater fish for commercial or personal use (except tropical fish). In 1988/89, 252 such permits were issued (up from 209 the year before), the great majority for rainbow trout.

Hatcheries:

Five provincial hatcheries and several contract facilities rear freshwater sport fish for stocking as fry, fingerlings, and catchable-size fish into lakes and streams across British Columbia.

In the provincial hatcheries in 1988/89, thirty-eight different stocks of ten species of salmonids were cultured, with over 58,000 brood fish captured and spawned. More than 83 tonnes of fish were produced, using just over 100 tonnes of food, for a very efficient food conversion ration of 1.25 : 1.0. As a result, releases of young fish from provincial hatcheries reached a record in 1988/89, as 12 million fish were stocked into 1,166 lakes and 62 streams.

A further 1.8 million steelhead and anadromous cutthroat were released from federal and other publicly supported facilities into 12 lakes and 57 streams.

Brood stock development is also being undertaken. Two captive rainbow trout brood stocks (Blackwater and Dean) were developed to augment depressed inland river populations. The ability of various strains of rainbow trout to compete with non-sport fish species in interior lakes has been found to vary, indicating that more competitive strains can be developed and utilized.

Fish health remained good in provincial hatcheries, as confirmed by an extensive testing program. More than 29,000 visitors to provincial hatcheries reflected public interest in the hatchery program.

Anadromous streams:

Hatchery fish accounted for almost 22 per cent of the steelhead catch in British Columbia in 1988/89. In the first full return cycle of the Kitimat River Hatchery, hatchery steelhead accounted for one-third of the total catch.

Small lakes:

In the Kootenays, Kiakho Lake was stocked with wild westslope cutthroat fish collected from the Skookumchuck Creek drainage. Once a cutthroat spawning population is established, eggs will be collected to stock lakes and streams in the area.

Summit Lake, near Naskup, was opened to fishing in May 1988 after rehabilitation with rotenone in 1986 and subsequent restocking.

A total of 95,000 rainbow trout, cultured at Hanceville and marked, were released into Puntzi Lake, where their success against severe coarse fish competition will be monitored for two years.

In the final stage of the Cameron Lake enhancement project in the Omineca-Peace River region, 600 walleye were transplanted in 1988/89.

Large lakes and inland streams:

About 900,000 kokanee fry were stocked in Okanagan Lake in the spring of 1989.

In a pilot program, 25,000 rainbow trout fry were raised at the federal Quesnel River Salmon Hatchery and released to enhance the large strain of rainbow trout in Quesnel Lake.

In 1988, the Kettle and Similkameen were stocked with three genetically different strains of rainbow trout, and further research is planned on the feasibility of stocking in streams with low densities of wild fish.

Managing Habitats

In the Recreational Fisheries Program, the term "habitat" refers primarily to environmental conditions affecting fish but includes the aesthetic surroundings of fishing locations, which surveys show to be of prime importance to anglers.

The main impacts on habitat of both kinds in British Columbia derive from the logging and mining industries and, on larger lakes and rivers especially, from urban and industrial development. An increasing proportion of the Recreational Fisheries Program effort is devoted to mitigating these impacts.

Managing habitats involves three activities: research and development, habitat protection, and habitat improvement.

Research and development

In habitat management in 1988/89, research and development emphasized habitat mapping, fertilization experiments, habitat assessment, and methods of mitigating environmental impact.

Habitat mapping:

Development of computer-assisted mapping software occupies a steadily increasing number of staff hours. In co-operation with the Ministry of Crown Lands, streams have been mapped in computer-readable form at 1 : 50,000 scale across nearly 90 per cent of the province and in greater detail across 20 per cent of the province. A computer-based system for estimating changes to stream features over time using measurements from aerial photographs (photogrammetry) was developed for testing in 1988/89.

In co-operation with the federal Department of Fisheries and Oceans, work began on identifying types of remote-sensed and other data that can be used in estimating habitat production potential. The result will be a basic Geographical Information System (GIS), which will be tested first in the Cowichan River basin.

Field testing and training of regional staff and consultants in stream survey techniques continued in 1988/89, and training in lake survey methodology began. Workshops in survey procedures, computer mapping requirements, and management applications continued to be held in co-operation with the Department of Fisheries and Oceans.

Fertilization experiments:

The addition of controlled amounts of nutrients to infertile streams is a new enhancement technique being demonstrated on the Keogh River. In years of stream enrichment, the numbers of steelhead smolts doubled. In coastal lakes, where deficiencies of nitrogen and phosphorus limit the abundance of rainbow trout, small additions of these nutrients have proved very successful in producing algae and zooplankton.

Habitat assessment:

In 1988/89, 21 lakes and stream systems in the Vancouver Island region and the Williston Lake and Toodoggone River areas were surveyed and assessed. The Nimpkish River watershed was inventoried to identify steelhead production capacity and enhancement potential. The habitat requirements of cutthroat in small streams tributary to the Fraser River below Hope were assessed in this second year of a five-year study.

Habitat surveys were undertaken on the St Mary River and its tributaries to support estimates of theoretical sport fish carrying capacity. Chehalis Lake and tributaries were

surveyed for the first time, and in the Lower Mainland forty urban ponds were examined for prospective fishing opportunities. A number were found suitable.

Winter limnological surveys were conducted on 120 lakes in the Cariboo, 73 by helicopter, and more than half were found to support fish during the winter.

Environmental impact mitigation:

In the second phase on the Fisheries/Forestry Interaction Programs, demonstration and long-term research projects were established in such areas as forest harvesting, alternative silvicultural programs, watershed rehabilitation, and slope stability assessment. Extensive involvement continued in the Carnation Creek project.

Applied research focused on terrain stability studies in the lower Mainland and on the stability of large river channels. Staff seminars were held, and work progressed on techniques for managing landslide-prone terrain. The "Terrain Classification Manual for B.C." was published.

Habitat protection

Referrals of projects that could affect fish habitat exceeded 20,000 in 1988/89, with a growing number related to large forestry and mining developments. In addition, 645 pesticide treatment referrals were received. A computerized referral system was established to cope with the task.

Habitat issues typically involve co-operation between several ministries and agencies. Recreational fishing staff participated in the following co-operative activities in 1988/89:

- work on Interior Fish/Forestry/Wildlife Guidelines like the Coastal Fish/Forestry Guidelines implemented in 1987.
- the Habitat Silvicultural Protection Committee, formed to direct expenditure of a $450,000 fund distributed between fisheries and wildlife programs to address the impact of the bark beetle.
- work on the Instream Flows Committee with the federal Department of Fisheries and Oceans completing draft recommendations for review.
- Forests/Environment ad hoc committee on integrated resource management.
- preparation of a "major project development review process".
- development of a system by which the Ministry of Energy, Mines and Petroleum Resources monitors placer mining operations to ensure habitat protection for fish and wildlife.
- development of education packages in a new Habitat Protection Communications Plan.

Anadromous streams and small lakes:

In the Babine watershed, the Ministry of Forests agreed to postpone forest access developments while management options were considered. High priority is given to preserving this world renowned steelhead fishery.

To establish a basis for measuring future impacts and selecting management options for the vast number of productive lakes and rivers in the Omineca-Peace region, baseline data are being collected on all aspects of these systems. In 1988/89, 25 rivers and 16 lakes were surveyed.

Large lakes and inland streams:

Management plans are proving useful on large lakes where differing local uses conflict. In 1988/89, management plans for lake char in the Skeena and Omineca/Peace regions and for the Skagit River were submitted for review, while draft management plans were under way for two of the most important fisheries in the province: Babine and Francois lakes.

The detection of northern pike, which prey on sport fish, in Summit Lake was further investigated. The Ministry collaborated with Ducks Unlimited to develop ways to prevent the movement of northern pike from the Peace River system, where they naturally occur, to the Fraser River system.

In anticipation of forthcoming forestry developments, pre-impact surveys of sport fish habitat resources were completed in the tributaries of the Lower Liard River.

Habitat improvement

One of the most important activities of the Recreational Fisheries Program is to enhance sport fisheries by habitat improvements of every kind.

In 1988/89, 47 fishery projects were conducted under the Habitat Conservation Fund for a total expenditure of $810,500. More than half the projects involved habitat improvements:

- stream enhancement (creating or restoring spawning habitat): 9 projects.
- lake enhancement (chemical rehabilitation, aeration, fertilization, bass habitat): 9 projects.
- stream protection (streambank fencing): 5 projects.
- fishway construction: 5 projects.

Anadromous streams:

Habitat improvement projects in 1988/89 in anadromous streams included the following:

- Fisheries staff worked with the Water Management Branch and the Department of Fisheries and Oceans to recommend appropriate flow modifications to the upper Cowichan River to enhance sport fishing.
- A steelhead fertilization feasibility study was completed on the Salmon River near Sayward.
- Enhancements of anadromous fisheries in northern Vancouver Island are underway.
- Enhancement opportunities were identified on the Seymour River, including a fishery at Rice Lake, on which development began.

Small lakes:

Habitat improvement highlights in small lakes included the following:

- Improvements were made to fish rearing and spawning habitat, including artificial reefs of old tires, in many Vancouver Island lakes.
- Rehabilitation of Larchwood Lake in the Kootenays proceeded nearly to completion.
- In the Okanagan region, a dam was built to raise the level of Rampart Lake and provide shoal area and food production for trout. Aeration systems were installed on two lakes in addition to existing systems on three others. Fishing was reopened on rehabilitated Burnell Lake with excellent results.

Wildlife Management Program

The purpose of the Wildlife Management Program is to ensure the abundance and diversity of wildlife in the province and to maintain and enhance the recreational and commercial benefits available from wildlife.

The Program guides the work of the Wildlife Branch and is delivered in the field by the Regional Fish and Wildlife Offices.

In 1988/89, the Program's aims and varied supporting activities could be placed in three broad groups:

- Species management: to ensure abundant and diverse wildlife populations of ecological, recreational, and economic interest by management methods appropriate to the different wildlife species.
- Habitat management and inventory: to maintain abundant and diverse habitats in which wildlife can thrive by protecting, planning, and administering significant habitats and by mapping and setting standards for existing and potential future habitat regulation in the province.
- Research and statistics: to provide a sound basis for long-term wildlife and habitat management by applied research and by collection of statistical data on wildlife populations and use.

Highlights of 1988/89 in these areas were as follows:

Species Management

In 1988/89, the Program recorded highlights of species management in the following categories of concern: hoofed game animals (ungulates), species of primarily ecological concern, problem wildlife, and commercial species.

Hoofed game animals (ungulates)

The estimated harvests of ungulates for 1988/89 were the highest in several years: 36,773 deer, 13,424 moose, 3,991 elk, 429 caribou, 1025 mountain goats, and 652 mountain sheep. These numbers reflected the status of animal populations that in most instances were estimated to have remained stable or increased in 1988/89.

A major focus of the year's activities was the process of developing new ungulate species management plans intended to bring á new degree of co-ordination to increasingly intensive management requirements. During the year, an analysis was completed of ungulate population inventory needs. A provincial bighorn sheep management strategy committee was also formed, and staff participated in the national Wood Bison Recovery Team meetings.

During the year, more than 30 range improvements were undertaken for deer, elk, moose, caribou, and mountain sheep, while elk, caribou, and mountain goats were transplanted in several areas to re-establish or supplement populations.

Species of primarily ecological concern

The Program addresses wildlife issues affecting species that are not necessarily of economic or recreational significance, such as some birds and non-game wildlife, including species that are potentially endangered.

Annual highlights from several continuing programs were as follows:

- *Birds*

  In a mid-winter survey, 497 persons counted 8,400 bald eagles.

  The first surveys of the breeding gyrfalcon in northern B.C. showed densities comparable to those in adjacent habitat in the Yukon.

  The "Co-operative Waterfowl Management Plan for British Columbia" was published by the Waterfowl Technical Committee.

- *Non-game wildlife*

  Painted turtles removed from Bunnell Lake before lake rehabilitation were found to have returned by travelling several kilometres overland.

  The Cascade frog appeared not to be in the Skagit watershed.

  In the Okanagan, the presence of the night snake was verified, and spotted bats were found to be foraging until mid-September.

- *Endangered species*

  During the year, seven species occurring in B.C. were designated nationally as rare and two as threatened.

  Under the Convention on International Trade in Endangered Species, 723 permits were issued for the transportation of endangered species.

Twelve bald eagles, which are relatively abundant in B.C., were sent to California to augment an endangered population there.

For the Vancouver Island marmot, a recovery team was appointed and a recovery plan drafted, while field research continued.

Problem wildlife

The Program takes action to address various problems caused by wildlife, on the advice of the Provincial Problem Wildlife Management Advisory Committee. In 1988/89, the most significant problems continued to be ungulate use of forage on private land and losses of livestock to predators, mainly wolves and coyotes.

Wolf depredations were more frequent in 1988/89 than the year before, though coyote depredations remained about the same. Wolf populations appeared to be increasing, most likely in response to growing ungulate numbers. Some light on this issue may be shed by a new moose and elk population monitoring program established during the year in the Muskwa area of the northeast.

Despite an increase in the number of knowledgeable wolf trappers, the wolf harvest has not grown. Hunting and trapping may reduce livestock losses in individual cases but are not expected to affect the total wolf population.

The increased damage to forage and crops reflects the growing ungulate population, in turn the result of a series of mild winters. Expanded hunting opportunities are being considered and might help alleviate the problem.

Commercial species

Trapping and commercial game farming were areas of activity in 1988/89.

Trapping:

In British Columbia, about 2,900 licensed traplines are worked by about 6,000 trappers. Each year 250 or more new trappers acquire licences after completing the compulsory Trapper Education Program. The Ministry maintains a close working relationship with the British Columbia Trappers Association.

In 1988/89, the continuing education refresher course for experienced trappers was substantially expanded following its successful introduction the previous year.

The year also saw the introduction of a series of management guidelines for trappers — setting forth population and habitat objectives for successful trapping practices. The first three manuals were issued, covering beaver, marten, and muskrat.

Commercial game farming:

Game farming is the captive rearing of game animals for commercial purposes on private land. To date, the species involved in B.C. are fallow deer, bison, and reindeer. Hunting of the captive animals is prohibited.

In July 1988, responsibility for the administration of game farming was transferred to the Ministry of Agriculture and Fisheries. The Ministry of Environment continues to be involved, as a member of the British Columbia Game Farming Advisory Council, to ensure that game farming operations are conducted in an environmentally sound manner.

Habitat Management and Inventory

Wildlife abundance and diversity depend crucially on environmental conditions as many kinds of economic development restrict and penetrate wilderness areas. Habitat management and inventory are therefore vital parts of the Wildlife Management Program.

Habitat management

To help maintain an appropriate environment in B.C. for wildlife — and for the enjoyment of wildlife — habitat management staff conduct five activities: habitat protection, land management, planning, development of wildlife viewing, and conservation fund administration.

Habitat protection:

In 1988/89, more than 20,000 resource development plans were referred by other agencies to Ministry regional offices for review as to their potential effects on wildlife. The review process was partly computerized during the year.

A provincial workshop began the development of a set of wildlife and forestry guidelines by collating existing guidelines. When combined, the joint guidelines will help regional staff expedite their review of forest development plans.

Land management:

In 1988/89, the plan of a system for designating Wildlife Management Areas was prepared for Cabinet approval, and a computerized land record system was set up. Also during the year, 2509 hectares of critical habitat were purchased at a cost of $575,000.

Under the Pacific Estuary Conservation Program, a co-operative plan with The Nature Trust of British Columbia, Ducks Unlimited Canada, and Wildlife Habitat Canada, 575 hectares of coastal wetland habitat were acquired and nearly 7000 hectares of crown land were designated for conservation.

Planning:

The year's planning highlights were as follows:

- Regional Wildlife Plans were completed for ten subregions.
- Several Provincial Species Plans were developed for further review.
- The first draft of a Provincial Wildlife Strategy was completed.

Development of wildlife viewing:

In 1988/89, a major initiative was begun to promote wildlife viewing in the province. Two committees on wildlife viewing were established: an interministerial committee (Environment, Parks, Tourism, and Forestry) and a public advisory committee (Federation of B.C. Naturalists, B.C. Wildlife Federation, Guide Outfitters Association of B.C., and the Council of Forest Industries).

Plans were developed for 14 potential viewing areas, with area development and a marketing strategy to follow.

Conservation fund administration:

In 1988/89, the Habitat Conservation Fund received revenue of $1.5 million from licence surcharges and other sources and funded 100 projects at a cost of $2 million. Both amounts were records.

The Public Conservation Assistance Fund provided grants totalling $100,000 to help individuals and organizations throughout the province carry on 44 conservation, wildlife, and fisheries projects.

Habitat inventory

The Ministry undertakes habitat mapping and develops standards and techniques for habitat evaluation and inventory across the province.

Mapping:

1988/89 mapping highlights were as follows:

- An ecoregion map of B.C. at 1 : 200,000 was completed and was used in the Royal British Columbia Museum's Birds of British Columbia project.
- Wildlife habitat maps at 1 : 500,000 for each of the Ministry's regions were completed which combined the ecoregion data with the Ministry of Forests vegetation zone data.
- Habitat mapping was completed for Wells Gray and Mount Robson Parks and for the Purcell Wilderness Conservancy.
- Habitat mapping was begun for the Atlin Lake district, the north side of the Peace River, and eastwards from the Purcell Wilderness Conservancy.

Developing standards and techniques:

Highlights of 1988/89 were as follows:

- An update was completed of the standard field data collection report, "Describing Ecosystems in the Field".
- Guidelines on monitoring habitat improvements, such as prescribed burning or planting, were introduced for testing.
- Work began to create a manual of standard habitat mapping criteria.

Research and Statistics

The Wildlife Management Program places much emphasis on research into species and habitat management and on the collection of statistical data from hunters.

Research

The wildlife research program was conducted and funded co-operatively with many government and private agencies. The year 1988/89 saw some new studies begun and further progress in ongoing studies.

New studies:

Studies begun in 1988/89 were as follows:

- *Cariboo Fisher Transplant Project*

  Declining fisher populations prompted this three-year study in the Beaver Valley, Skelton Valley, and Jessica Lake areas northeast of Williams Lake. The study will be an attempt to re-establish a sustainable fisher population, examining transplant methods, population dynamics, and habitat utilization. The goal will be to develop a habitat suitability index for fisher transplants.

- *Khutzeymateen Valley Grizzly Bear Study*

  This four-year study of a distinctive and renowned grizzly population north of Prince Rupert is a joint project of the Ministries of Environment and Forests.

- *Marten Habitat Suitability Research Program*

  This five-year study, in the Emerson Creek drainage near Houston, will develop a habitat suitability model for marten in the sub-boreal spruce geoclimatic zone which can be used for better consideration of marten winter habitat in forest management.

- *Gaspard Saskatoon*

  Saskatoon is a preferred forage on winter ranges for mule deer, and its berries are eaten by many kinds of birds. This study, in the Gaspard Creek area of central British Columbia, will determine whether Saskatoon can be re-established in logged areas of an important biogeoclimatic zone. Thirty sites were selected; exclosures were erected and soil and vegetation analysed. 1,000 seedlings will be planted in the exclosures.

- *Geographic Information System (GIS) Co-ordination*

  GIS technology allows ready visual access to many types of environmental data and their geographic distribution on microcomputer screens. This information was previously separately filed and perhaps not even mapped. Users can specify study areas and combinations of data to be shown as maps on screen or printed out. The technology is a valuable tool for environmental analysis.

  Because of the growing importance of GIS technology in Ministry activities, in 1988/89, the Wildlife Technical Data Committee established a GIS group to test applications, oversee uses of the technology within the Ministry, and co-ordinate GIS use with the planning systems of the Ministry of Forests.

- *Raccoon/Seabird Interactions*

  A study was begun to assess raccoon predation on seabird colonies in the Queen Charlotte Islands and make recommendations for mitigation.

- *Herbicide Impacts on Grizzly Bear Forage*

  There is concern that herbicides used by forestry companies might harm vegetation eaten by grizzlies. This two-year study investigates the effects of glyphosphate applications on grizzly bear forage species in logged floodplain ecosystems of the coastal western hemlock zone. The findings will contribute to integrated planning of forestry practices and grizzly bear habitat management.

Ongoing studies:

In 1988/89, research continued and substantial progress was made on several prominent multi-year studies:

- Integrated Wildlife/Intensive Forestry Research Program: impact of intensive forestry on elk and deer.
- Coastal Grizzly Project: impact of forestry on grizzly bears in coastal areas.
- Wildlife Habitat Handbook: how to assess potential impacts of a forest development on all classes of vertebrates in the area.
- Spatsizi Wildlife System: interactions of ungulates (moose, caribou, Stone sheep, mountain goats) and their predators (wolves and grizzly bears) in northeastern B.C.
- Flathead Grizzly Project: impact of resource developments and hunting on grizzly bears and their habitat in the Flathead River drainage.
- Ecology of Southern and Central Interior Caribou: caribou studies in three areas of the B.C. interior.
- Nimpkish Valley Wolf/Deer Project: impact of experimental wolf control on deer populations in northern Vancouver Island.
- Research Needs for Habitat Enhancement: analysis of research projects required to meet the needs of wildlife and habitat managers.
- Cougar Ecology: study in light of the cougar's importance as a predator of bighorn sheep, especially rams, in the Junction Wildlife Management area.
- Health of Wildlife: identification of diseases and parasites of importance to wildlife populations.

Also in 1988/89, the Wildlife Branch published 13 technical research reports on a variety of wildlife issues.

Hunting statistics

The Branch compiles statistics both on hunting activity and on characteristics of animals harvested.

Summary Statistics Data Base:

This integration of several major provincial data systems on hunters and their activity continued to be enhanced in 1988/89. The data base gives regional staff immediate access to the latest animal and hunter information and contains data going back to 1976.

Limited Entry Hunting Draw:

This exceedingly popular program to distribute big-game hunting licences has grown from 163 applications at its inception in 1974 to

more than 100,000 applications by 1988. A highlight of the 1988 draw was the introduction of the bearded turkey as an available species.

The draw for the fall 1988 hunt received 101,421 applications (up 16 per cent from the year before) and assigned 30,507 authorizations for nine species in 59 areas, involving 648 hunts. The smaller draw for the spring 1989 grizzly bear hunt received 1,831 applications for 496 authorizations.

Tooth Return Program:

In 1988, hunters returned more than 9,000 teeth from deer, moose, and elk to the Wildlife Branch, allowing the ages of harvested animals to be determined.

Annual hunter sample:

The annual Hunter Sample questionnaire mailed to 90,000 resident hunters allowed harvest estimates to be made for big game, waterfowl, and upland game birds. Response rates averaged 76 per cent.

Compulsory Inspection:

All hunters of caribou, cougar, grizzly bears, mountain sheep, and mountain goats, and elk and wolf in some areas, are required by law to complete a Compulsory Inspection Data Form. In 1988/89, 3,335 individual reports were received. This information allows important wildlife management to be undertaken.

CORE Program

The Conservation Outdoor Recreation Education Program is designed for individuals wanting to obtain a hunting licence in British Columbia. Successful completion of the CORE examinations qualifies a B.C. resident to apply for a hunting licence.

In 1988/89, the CORE Program was placed entirely under the control of the Wildlife Branch. Student volunteer instructor and examiner participation was simplified, and course attendance was made optional for examination preparation.

The result was a system more accessible to students. In all, 6,014 graduates were recorded, a 70 per cent increase over the year before, and 86 per cent of students voluntarily attended courses of instruction. More than 120,000 students have graduated from CORE since 1974.

LIMITED ENTRY HUNTING DEMAND 1988/89

Species	Applications Received	Authorizations Available
Caribou	167	942
Elk	26,639	9,331
Grizzly Bear	2,693	587
Moose	34,417	7,907
Mountain Goat	7,182	2,044
Mountain Sheep	4,808	349
Mule Deer	14,954	6,867
White-tailed Deer	10,124	3,760
Bearded Turkey	893	30
TOTAL	103,252	31,817

RESIDENT HUNTING LICENCE SALES 1986–1989

	1986/87		1987/88		1988/89	
	Number	$ Value	Number	$ Value	Number	$ Value
B.C. Resident	117,314	$1,642,396	114,669	$1,790,116	114,831	$1,837,296
Senior Citizen	11,286	11,286	12,169	12,169	11,642	11,642
Black Bear	17,138	137,104	19,006	152,048	18,175	145,400
Caribou	1,138	22,760	1,236	24,720	1,235	24,700
Cougar	413	8,260	509	10,180	572	11,440
Deer	106,090	848,720	121,467	971,736	129,244	1,033,952
Elk	16,933	338,660	16,517	330,340	17,310	346,200
Grizzly Bear	1,041	72,870	1,218	80,012	1,118	78,260
Moose	46,526	930,520	48,509	970,180	49,105	982,100
Mountain Goat	1,781	53,430	1,804	54,120	1,938	58,140
Mountain Sheep	1,690	84,500	1,905	95,250	2,071	103,550
LEH Hunting Apps.	81,769	245,307	94,185	282,555	108,589	325,767
TOTAL	403,119	$4,395,813	433,194	$4,773,426	455,830	$4,958,447

NON-RESIDENT AND NON-RESIDENT ALIEN LICENCE SALES 1986–1989

	1986/87		1987/88		1988/89	
	Number	$ Value	Number	$ Value	Number	$ Value
Non-resident alien	4,321	$388,890	4,523	$485,190	4,767	$548,205
Non-resident	635	8,890	1,177	18,832	766	12,256
Non-resident alien small game	411	16,440	421	21,050	484	24,200
Black Bear	2,570	128,500	2,900	145,000	3,062	153,100
Caribou	495	59,400	537	64,440	632	75,840
Cougar	62	7,440	68	8,160	62	7,440
Deer	1,181	70,860	1,462	87,720	1,807	108,420
Elk	963	115,560	1,080	129,600	1,056	126,720
Grizzly Bear	848	271,360	831	265,920	808	258,560
Moose	2,537	304,440	2,628	315,360	2,625	315,000
Mountain Goat	798	103,740	779	101,270	790	102,700
Mountain Sheep	394	118,200	374	112,200	396	118,800
Wolf	811	20,275	952	23,800	1,147	28,675
TOTAL	16,026	$1,613,995	17,732	$1,778,542	18,402	$1,879,916

SUMMARY OF GUIDED HUNTER ACTIVITY IN THE 1988/89 HUNTING SEASON

Region	Number of Active Guide Outfitters	Number of Active Assistant Guides	Number of Guided Resident Hunters	Number of Guided Non-resident Canadians	Number of Guided Non-resident Aliens	Moose	Mountain Goat	Caribou	Deer	Mountain Sheep	Grizzly Bear	Black Bear	Elk	Cougar	Wolf	Upland Birds	Waterfowl	Other
1	6	27	4	5	138	0	0	0	22	0	6	134	4	3	0	0	0	0
2	4	4	0	0	9	0	1	0	0	0	0	8	0	0	0	0	0	0
3	14	26	2	1	92	9	11	0	11	8	1	39	0	3	0	0	3	0
4	37	247	3	25	854	23	94	7	106	15	15	134	241	4	2	0	1	0
5	62	170	17	6	818	247	22	4	126	6	14	79	0	4	0	58	6	1
6	57	169	4	21	786	296	151	90	18	64	35	176	0	0	21	26	0	2
7	97	383	30	35	1,618	781	168	149	5	174	65	365	118	0	24	74	0	4
8	12	48	6	2	230	0	4	0	67	9	0	88	1	23	0	4	1	10
Prov. Totals*	261	996	66	95	4,461	1,356	451	250	355	276	136	1,023	364	37	47	162	11	17

* Some guides and some hunters were active in more than one region, hence the sum of the regional figures in some guide and hunter categories exceeds the number given for the province

BRITISH COLUMBIA WILD FUR HARVESTS 1983–1988

Species	Number of Pelts by Fur Harvest Year				
	1983/84	1984/85	1985/86	1986/87	1987/88
			($ millions)		
Beaver	12,666	13,297	13,668	19,513	13,974
Muskrat	328	14,841	10,693	13,088	15,373
Mink	4,165	3,183	2,832	3,311	4,971
Otter	543	673	650	654	641
Coyote	4,081	3,460	2,783	3,872	3,482
Fox	891	764	450	828	684
Wolf	186	232	156	201	126
Weasel	8,159	8,058	3,600	5,537	9,303
Wolverine	265	260	210	246	221
Skunk	60	23	55	15	6
Fisher	754	630	489	457	325
Marten	28,350	45,130	1,206	31,627	39,287
Lynx	2,760	1,668	134	1,050	1,113
Bobcat	215	271	24,909	238	288
Squirrel	87,375	31,663	29,573	26,535	23,215
Raccoon	791	978	1,337	757	798
Black Bear	368	364	343	421	423
TOTAL VALUE	3.8	4.9	3.2	5.8	5.3

ESTIMATES OF RESIDENT HUNTER HARVEST 1979–88

Year	Hunting Licence Sales	Deer	Moose	Elk	Goat	Sheep	Caribou	Grizzly Bear	Black Bear	Grouse	Ducks	Cougar
1979	163,088	29,965	13,045	1,471	360	216	147	177	2,731	478,579	160,307	150
1980	167,879	36,079	12,486	1,996	421	198	138	180	5,670	306,057	145,549	117
1981	174,088	35,190	10,752	1,811	396	263	127	225	3,247	214,656	145,713	106
1982	154,143	34,774	10,906	2,532	408	183	150	185	3,180	258,461	117,564	130
1983	144,669	29,804	9,613	3,321	581	218	145	201	3,557	179,078	86,007	120
1984	136,930	32,673	9,196	4,183	576	192	150	195	3,531	133,683	112,150	160
1985	130,236	27,337	10,214	3,344	480	216	159	178	3,061	186,739	106,563	100
1986	128,600	29,077	12,076	3,170	603	312	141	190	3,262	238,143	93,664	139
1987	126,838	32,429	11,957	2,499	567	329	180	173	2,280	453,073	116,550	113
1988	126,473	36,605	12,210	3,757	588	458	195	206	3,342	217,678	71,893	199

Air Management Program

The goal of the Air Management Program is to maintain good air quality in B.C. and to make available to the public the atmospheric information needed for the proper management of provincial resources.

In pursuit of this goal, the Air Management Branch in 1988/89 undertook five kinds of action:

- Developing air quality standards: to establish air quality criteria and objectives (in conjunction with the Waste Management Branch) by research on contaminants that affect health, on their emission sources, and on standards in other jurisdictions.
- Monitoring air pollution: to identify atmospheric pollution problems by monitoring for contaminants of concern at appropriate locations.
- Managing air pollution reduction: to secure reductions in air pollution by taking action on identified episodes and particular sources and by encouraging the development of control strategies to remedy longer-term problems.
- Supplying information and advice: to support efforts of others which can benefit air quality by making available the Branch's data and expertise to the public, to industry, and to other ministries and governments.
- Supervising quality assurance: to support monitoring and inspection of discharges in the private sector by co-ordinating development of the quality assurance system of technical auditing.

Following are the highlights of 1988/89 in these areas.

Developing Air Quality Standards

The Air Management Program develops air quality standards applicable to emissions to the atmosphere from industrial and other — usually large-scale — sources. These air quality criteria, as they are called, specify particular contaminants in exhaust gases that should be measured and give concentrations of them that should not be exceeded. These criteria are called objectives when applied in a specific local "airshed". Objectives vary by industry and by location, depending on the existing levels of those contaminants in that airshed and the estimated harm they cause.

To establish air quality criteria and objectives therefore demands extensive research:

- on the local impacts of air pollution on human health and the environment, identifying the contaminants responsible.
- on the fluctuating concentrations of those contaminants in the local air in various weather conditions.
- on the main emission sources of the contaminants, particularly on individual emission rates and the improvements possible with control technologies.

This information is used to develop proposed maximum contaminant concentrations in the emissions specified for the main emitters in the area. These are usually industrial plants but also sometimes include municipal incinerators, commercial and residential buildings, and vehicles.

The criteria themselves are not legally enforceable, but they may be incorporated in regulations or permits that require upgrading of existing facilities and they may prevent approval being granted for new facilities that do not meet them.

In 1988/89, Air Management staff worked on these matters as follows:

Federal-provincial issues:

- contributing B.C. experience and data to the development of federal air quality objectives for sulphur dioxide, carbon monoxide, nitrogen oxide, hydrogen fluoride, ozone, and hydrogen sulphide.
- participating in federal/provincial discussions on vegetation sensitivity guidelines.
- helping federal/provincial committees draw up a list of 52 hazardous air pollutants for future investigation.

Regional and provincial issues:

- discussing with American federal and state officials the effects of acid rain on the Pacific Northwest and the effects of oxidants on forest nursery seedlings.
- working with the Ministries of Highways and Transportation and Forests in evaluating methods of applying dust suppressants in dry weather and road salt in winter.

Local issues:

- studying the impact of fine smoke particles on health in Port Alberni.
- examining vegetation in Trail, Port Alice, and the Howe Sound area for the impact of sulphur dioxide, hydrogen sulphide, mercury, lead, and fluoride.
- investigating the environmental impacts of the new Greater Vancouver Regional District waste incinerator in Burnaby.

Monitoring Air Pollution

Technical equipment is used to measure contaminant concentrations in samples of air. Samples drawn from emission plumes at a stack can be compared to the air quality permit limits pertaining to that facility and used to evaluate individual success in reducing pollution. Samples drawn from free "ambient" air measure the extent of saturation of the local airshed by many sources and thus indicate the overall efficacy of collective efforts.

In British Columbia, most ambient air monitoring is conducted by government, while most emission monitoring is conducted by the emitters themselves. Assuring the quality and consistency of the various monitoring activities was an important issue in 1988/89, and is discussed later.

Contaminant levels in free air were measured continuously by well over 100 ambient air monitors around the province: 33 operated by the Ministry, 60 operated by the Greater Vancouver Regional District, and 38 operated by industry. Contaminant levels in stack emissions were measured by laboratory analyses of about 18,000 samples of such gases taken at more than 500 locations throughout the province.

Special monitoring programs continued to be conducted at places where particular problems exist:

- At Prince George, which still experienced high pollutant levels from nearby pulp mills, the Total Reduced Sulphur monitoring network was re-equipped with new instruments.
- At Cranbrook, special analyses of pollution caused by residential wood smoke showed that high concentrations of hazardous hydrocarbons occurred during temperature inversions, but that the small size and high reflectivity of suspended smoke particles posed less of a problem to human health than visible smoke densities might suggest.
- Similar studies of smoke particles and hazardous hydrocarbons in the air were underway at Powell River, Comox, and Gold River for wood stove smoke and in the Okanagan for slashburning smoke.
- An ambient air quality monitoring network was established for the Howe sound area.
- Monitoring of acid rain was conducted around the Strait of Georgia, and monitoring of the chemistry of high elevation fog and precipitation at Mt Seymour.

As the overall monitoring effort grows, data management and analysis systems correspondingly gain importance. The Ministry's Continuous Air Monitoring Information Management System was developed further in 1988/89. Preparations were also made to enable the system to begin accepting data generated by industry monitoring systems in early 1990.

By 1988/89, advanced special data systems were operating in Victoria, Port Alice, Squamish, Prince George, Castlegar, Robson, Trail, Longdale, and Horseshoe Bay. These systems not only monitored selected air contaminants continuously but also automatically identified and reported exceedances of air quality objectives at the moment they occurred.

Managing Air Pollution Reduction

Being able to identify air pollution events — times and locations in which air quality objectives are exceeded — immediately raises the question of what the government will do about these problems. A rapidly rising priority is the development of plans of action to take when the monitoring systems show that air pollution has reached levels that require something to be done.

The Air Management Branch addresses this question in two ways. First, episodic management techniques have been developed for many locations by which, as air pollution indices rise, a sequence of publicly broadcast warnings and industrial process cutbacks are undertaken to mitigate effects and halt the increase in pollution.

The second approach, seeking a more permanent solution, is to promote the development of air management plans and control strategies, beginning with known problem locations and issues. The following are some examples:

Ozone control in the Lower Mainland

Analyses have shown that ozone is the leading air pollution problem in the lower mainland and that the high concentrations of vehicles are largely to blame. In 1988/89, air management staff encouraged the development of control strategies in several ways:

- *International conference on ozone control*

  Support was given to the Air Pollution Control Association's International Conference on issues related to ozone control and to a subsequent Modelling Workshop focusing on Lower Mainland circumstances.

- *Vehicle inspection and maintenance program*

  A study was sponsored of options for reducing vehicle emissions which led to a recommendation for a compulsory system of vehicle checks and maintenance.

- *Control of hazardous emissions from gasoline marketing*

  Staff participated in a multi-government/industry study of technologies and costs for controlling noxious vapors released in gasoline storage and distribution.

- *Alternative vehicle fuels*

  A joint study with Environment Canada continued on the ability of alternative fuel use to reduce harmful vehicle emissions.

Acid rain control strategy for Western Canada

The achievement of a joint acid rain control strategy was the goal of a committee of deputy ministers from the western provinces. In support of this initiative, air management staff in 1988/89 contributed data and expertise to a number of technical studies:

- *Acid fog on Mt. Seymour*

  Preliminary analyses of high elevation fog on Mt. Seymour showed significant acidity (pH 3.5-5.0).

- *Effect of alkaline soil and dust on acid precipitation*

  A study of the mitigative effect of alkaline soil and dust on acidic precipitation.

- *Reduced acid loading targets for western provinces*

  A study of what degree of reduction in acid deposition is environmentally desirable and feasible.

  First drafts of the reports on both the latter studies were completed and reviewed by committee members.

Air pollution in Prince George

A program has been established to reduce releases of odour-causing compounds, mainly reduced sulphur, from Prince George pulp mills by the early 1990s. The mills are applying advanced technologies to strip dissolved sulphur from liquid effluents and to scrub it from exhaust gases.

Wood smoke pollution

Smoke from wood waste burners, residential wood stoves, and slashburning are serious concerns in many locations, especially in interior areas. Options are being explored. In 1988/89, a report on using wood waste for power generation predicted higher power costs but improved air quality. Ministry staff participated in the development of national guidelines for wood stove fire systems. A system of forecasting and alerting for voluntary cutbacks of wood stove emissions was recommended for the City of Cranbrook.

Specific studies

A number of studies in 1988/89 helped lay a basis for air management actions:

- *Gas turbine generators*

  An assessment of the potential effects on air quality of a proposed gas turbine electrical generation station was conducted and the results presented to the Utility Commission.

- *Contaminant emission inventory*

  An emission inventory for selected contaminants in British Columbia, based on an analysis of 1985 data, was completed.

- *Emission audit manuals*

  Manuals instructing operators of oil and gas production facilities on identifying and quantifying air emissions were prepared.

  Ministry staff continued to participate in federal, provincial, and regional government working groups to co-ordinate emission management systems and to share data.

Supplying Information and Advice

The Air Management Branch makes available both its data and its expertise to the public, to

industry, and to other Ministries and governments in a number of ways. Highlights of 1988/89 were as follows:

- All air quality and climatological data for the province were collected and entered on computerized files.
- The operations of 58 meteorological stations were co-ordinated, with data being collected on temperature, precipitation, wind, and solar radiation.
- Staff responded to 167 requests for climatological data or services and provided meteorological information relevant to agriculture to government agencies and the public.
- A joint publication with the Ministry of Agriculture and Fisheries was prepared entitled "British Columbia Frost Protection Guide".

Supervising Quality Assurance

In environmental monitoring and analysis, accuracy of data is vital. Monitoring and technical analytical systems use instruments that can drift out of adjustment and employ sampling and test protocols that may not always be followed. Such systems are therefore inspected and audited, and deviations are identified and corrected.

In 1988/89, attention was drawn to the Ministry's inspection and auditing capabilities by a high-profile event: the sale of the Environmental Laboratory to a private company. The question raised was how government could ensure accuracy in monitoring and analysis if these tasks were privately performed.

The Air Management Branch, through which the Environmental Laboratory reported, responded by explaining the role of quality assurance in the Ministry's overall information system. What was privatized was the sample analysis part of the environmental data system. The quality assurance function, the inspection of equipment and procedures, had been separate from the Environmental Laboratory and would remain within the government.

However, the quality assurance function henceforth would have to be strengthened, not only because of privatization but also because of the continuing rapid growth of the information collecting and analysis systems as a whole.

Pesticide Control Program

The Pesticide Control Program seeks to ensure that only federally approved pesticides are used in the province, that they are handled safely, and that they are employed in ways that minimize environmental risks and impacts. The use of pesticides is closely controlled because it involves the deliberate introduction of toxins into the environment.

The Program's control of pesticide use involves activities in five broad areas:

- Legislation: to establish a basis for regulating all aspects of pesticide use.
- Permits: to ensure that adequate controls are placed on pesticides applied to public land and other specified uses.
- Licensing and training: to ensure that companies that sell pesticides or apply pesticides as a service comply with safety and training requirements.
- Enforcement and monitoring: to ensure that conditions of licences and permits are fulfilled, that proper records are kept, and that pesticide residues levels in the environment are safe.
- Public information: to inform and advise the public on the dangers and proper management of pesticides.

Pesticide use in British Columbia

Pesticides are chemicals used to control plant and animal pests, such as insects (insecticides), weeds (herbicides), fungi (fungicides), rodents (rodenticides), and others. They are used throughout the province by industrial companies, farmers, pest control firms, foresters, and homeowners.

In British Columbia, the largest single use of pesticide — perhaps as much as four-fifths of the total volume — is the application of wood preservatives in the forest products industry. The next largest sector of use is estimated to be agriculture, followed by pest control service companies.

Legislation

In 1988/89, important amendments were made to pesticide control regulations affecting the pesticide classification system and the certification of applicators.

A new classification system

A new pesticide classification system was adopted which made regulatory requirements easier to apply and understand. Five pesticide classes were distinguished as follows (in ascending order of toxicity and progressively tighter controls):

- exempted from regulation.
- domestic (restrictions for vendors and for use on public land).
- commercial (additional storage and purchasing restrictions).
- restricted (additional requirement for applicator certificate).
- permit-restricted (additional requirement for permit).

Sales records with names of vendors and purchasers must be kept for all purchases of commercial, restricted, or permit-restricted pesticides.

Certification of applicators

Another amendment to the regulations was the requirement that pesticides in the two most hazardous classes (restricted and permit-restricted) could be purchased and applied only by someone properly trained and in possession of an Applicator Certificate.

This stipulation meant that for the first time, many farmers would have to undergo training and certification to use pesticides frequently employed in agriculture. Because of the need for training, the effective date of this requirement was postponed to January 1, 1992.

Permits

Pesticide use is regulated partly through the permit system. Permits are required in three circumstances:

- Pesticide Use Permits: any applications of non-exempted pesticides to public land or to private land used for forestry, transportation, or public utilities.
- Special Use Permits: any application of a pesticide for a non-registered use (such as for experimental purposes).
- Restricted Use Permits: any application of permit-restricted pesticides.

Permit applications are reviewed by regional staff and by members of the Pesticide Control Committee, a group with representation from other ministries and from the federal government.

In 1988/89, applications for Pesticide Use Permits (683) were up by 7 per cent over the year before, for Restricted Use Permits (24) were down by 14 per cent, and for Special Use Permits (65) were up by 8 per cent.

Anyone can dispute the issuance of a permit by appeal to the Environmental Appeal Board. In 1988, appeals were lodged against 26 permits. Ten of these appeals were still active at year's end, but of the other 16, 11 appeals were withdrawn or dismissed, while two permits were cancelled before the hearing and three were amended by the Board.

Licencing and Training

Pesticide control staff are responsible for issuing licences to businesses that sell or apply pesticides and for issuing certificates to people who have obtained adequate training to sell or use pesticides.

Licences

Pesticide Control staff review applications from businesses for annual Pesticide Vendor Licences or Pesticide service Licences. In 1988/89, a total of 813 Pesticide Vendor Licences and 875 Pest Control Service Licences were issued in the province.

Training and certification in pesticide management

In 1988, regional staff assisted with 102 pesticide training courses. Nearly 4,000 exams were written, and just over 3,000 certificates were issued (13 per cent fewer than the year before). About 60 per cent of the certificates were issued to qualified applicators and 40 per cent to qualified dispensers.

The involvement of colleges and professional instructors in pesticide applicator training has been promoted where possible. Colleges on Vancouver Island, in the Lower Mainland, and in the Okanagan provided courses in 1988.

Work began on a manual to help farmers train for pesticide applicator certification. The manual is to be produced by the Open Learning Agency, with direction from the Pesticide Control Branch, the Ministry of Agriculture and Fisheries, and the Federation of Agriculture.

Other training activities during the year included standardization of study kit materials, updating of examinations, and liaison with other provinces in developing national standards.

Enforcement and Monitoring

The Pesticide Control Program enforces its regulations and monitors the environment for pesticide chemicals to check that the regulatory system is working effectively.

Enforcement

Inspectors examine storage facilities operated by pesticide vendors and applicators and observe the adherence to permit conditions during pesticide applications.

In 1988/89, private contractors conducted inspections and submitted data to the Ministry for analysis for 578 forestry permits. During the year, Pesticide Control staff themselves made 1,522 inspections of pest control service and pesticide vendor facilities.

Pesticide Control staff during the year also investigated 241 incidents of potential pesticide misuse or environmental contamination. These incidents consisted of allegations of such things as poisoning of persons, domestic animals, wildlife, birds, and fish; spray drift damage to vegetation; and spills and fires involving pesticides.

As a result of the inspections and investigations in 1988/89, two permits were suspended or revoked, 44 charges were laid, 16 tickets were issued, $5,100 in fines was levied, and numerous warnings were issued for minor first infractions.

Monitoring

The sampling program continued on 25 selected streams and rivers. Results showed that any pesticide residues present were well below water quality objectives.

In autumn 1988, a food analysis project examined 251 samples of six B.C. food crops (apples, cucumbers, pears, peppers, potatoes, and tomatoes) for selected pesticides. Again the results showed that the few pesticide residue traces detected were well below Health and Welfare Canada guidelines.

Public Information

The Pesticide Control Program supplies the public with information and advice on the safe use of pesticides.

In 1988/89, besides handling many inquiries from the public, staff gave guest lectures to meetings at colleges, forestry committees, and community horticultural groups as well as appearing on radio talk shows to answer questions and discuss safe handling with the public. A brochure, "Safe Pesticide Use Around the Home and Garden", was distributed on request to the public, schools, and garden shops.

SUMMARY OF PESTICIDE CONTROL PROGRAM ACTIVITIES BY REGIONS
1988/89 FISCAL YEAR

	Region 1	Region 2	Region 3	Region 4	Region 5	GRAND TOTAL
Licencing:						
Vendor Licences Issued	230	323	136	27	97	813
Service Licences Issued	231	364	137	22	121	875
Permits:						
Pesticide Use Applications	70	126	104	41	342	683
Special Use Applications	8	21	19	2	15	65
Restricted Use Applications	6	16	2	—	—	24
Training and Certification:						
Pesticide Applicator and Dispenser Courses	36	47	9	0	10	102
Course Attendance	519	770	423	0	176	1,888
Study Kits Issued	935	1,580	1,319	250	574	4,658
Examinations Written (Courses and Home Study)	769	1,674	857	131	565	3,996
Certificates Issued	566	1,315	624	103	416	3,024
Failures	200	359	254	38	239	1,090
Compliance:						
Vendor and Applicator Inspections	239	998	197	76	12	1,522
Permit Inspections	99	107	146	82	227	661
Licences Suspended/Revoked	0	0	0	0	0	0
Permits Suspended/Revoked	0	0	0	0	2	2
Tickets Issued	10	0	6	0	0	16
Charges Laid	4	23	11	4	2	44
Investigations:						
Pesticide Accident/Misuse Investigations	54	107	63	16	1	241

Notes: — Data is presented for the five Ministry regional offices which handle Pesticide Control Program functions:

Region 1 — Vancouver Island and Queen Charlottes
Region 2 — Lower Mainland
Region 3 — Okanagan, Thompson-Nicola and Cariboo
Region 4 — Kootenays
Region 5 — Northern British Columbia, including Prince Rupert, Prince George and Peace River areas

— Permit inspections include inspections by contract inspectors.

Planning and Assessment Branch

The Planning and Assessment Branch focuses on issues in which the policy of the Ministry as a whole must be developed and stated or in which the views of several branches must be combined. The Branch also rounds out the environmental assessment capability of the Ministry by contributing analyses of social and economic impacts.

In 1988/89, the Branch fulfilled these functions through three broad types of activity:

- Project review co-ordination: presenting a Ministry position on major project proposals by soliciting, compiling, reconciling, and explaining the comments of the various branches potentially concerned.
- Environmental planning leadership: spearheading the development of environmental management plans for specific areas in the province to guide the decisions of the Ministry's regional managers.
- Policy development: working with other jurisdictions to analyse joint environmental concerns and formulate common strategies, and working within the Ministry to determine long-term management directions.

In 1988/89, the policy development area grew substantially in importance.

Project Review Co-ordination

Major project proposals were reviewed in three categories: energy projects, mining projects, and other development proposals.

Energy projects

In British Columbia, energy project proposals are evaluated under the Energy Project Review Process co-ordinated by the Ministry of Energy, Mines and Petroleum Resources. The Ministry of Environment makes important contributions to this process by reviewing each proposal, analysing and evaluating the project's potential environmental impacts, suggesting options for mitigating impacts, and making recommendations on the acceptability of the proposal.

In 1988/89, the Planning and Assessment Branch co-ordinated the Ministry's review of the following energy project proposals:

- West Kootenay gas turbine generator: A proposal to adapt a used turbojet aircraft engine to generate electricity from natural gas was found to be an inefficient use of energy and likely to cause significant local air contamination by nitrogen oxides.
- Independent power generation: Seventy proposals were received from independent power producers to generate electricity from low-head hydro and thermal installations. About one-third of them will be assessed in detail, including a major coal-fired proposal by Fording Coal Ltd in the Rocky Mountains.
- Electrical transmission lines: Three transmission line construction proposals were reviewed. The issue of hazards to public health from electromagnetic fields in the vicinity of transmission lines was also analysed.
- Vancouver Island gas pipeline: The Branch helped develop technical Terms of Reference for consultants to be involved in the planning of the pipeline.
- Site C dam: Assistance was provided to B.C. Hydro in developing studies to evaluate fisheries resources that could be lost as a result of this project on the Peace River.

Mining projects

As with energy projects, the Ministry contributes in the same way to proposals submitted to the province's Mine Development Review Process, which is also co-ordinated by the Ministry of Energy, Mines and Petroleum Resources.

In 1988/89, 37 projects were reviewed by the Ministry at various stages of the Process. Among them were large and complex mine proposals such as Cinola Gold in the Queen Charlotte Islands, Windy Craggy in the far northwest corner of the province, and Samatosum in the south central region, as well as smaller proposals such as Laredo Limestone on Aristazabel Island and Treasure Mountain, a silver/lead/zinc mine in the southern interior.

During the year, seven of these projects were approved in principle to proceed to the next phase of development, in which permit requirements must be identified and met.

Other development proposals

In 1988/89, major development projects that could have significant environmental impacts but were not related directly to energy or mining lay outside the two existing formal government review processes. The government's review of these other proposals was led by the Ministry of Environment on a project-by-project basis.

During the year, two such proposals were reviewed:

- Fibre optic transmission line: B.C. Tel, for the British Columbia section of the new cross-Canada fibre optic telephone line, co-operated closely with the Ministry in undertaking comprehensive analyses of environmental impacts along the route and in developing innovative and thorough mitigation methods. The Branch reviewed progress and advised on line construction as it took place.
- Water supply and sewage treatment systems: The Alcan hydroelectric water diversion at Kemano led to water supply and sewage treatment proposals for Vanderhoof and Fort Fraser, whose review was co-ordinated by the Branch.

Environmental Planning Leadership

Regional resource managers from time to time must make decisions involving tradeoffs between competing impacts, uses, and priorities. To help them make these decisions, the Ministry, led by the Planning and Assessment Branch, establishes environmental management plans for areas with identified issues, setting forth the priorities and objectives in those areas.

In 1988/89, progress was made on such plans as the following:

- Finlay-Omineca Strategic Environmental Plan: Having analysed the impact of the Williston Reservoir on the lands and resources inundated by it, this plan for resource management set a foundation for an agreement with B.C. Hydro on compensation for losses in fish and wildlife.
- Nechako River Management Plan: The Nechako River watershed is affected by Alcan's Kemano Completion water diversion project. A Water Management Plan to guide future allocation decisions was substantially completed.
- Oyster River Water Management Plan: A plan was published outlining policies and management activities for the Oyster River watershed, where allocation problems were expected in view of growing demand and limited water resources.
- Balfour/Brilliant Environmental Management Plan: A plan was initiated for future resource management in this area in the West Kootenay region, based on supply and use of environmental resources.
- Bulkley Valley Moose Management Plan: This plan set objectives for managing moose populations and habitat carrying capacity using computerized modelling to assess the impacts of agriculture and forestry.
- Nechako River Wildlife Management Plan: A Wildlife Management Plan outlining wildlife objectives in view of agriculture and land use pressures and incorporating innovative computer modelling of geographic data was in progress.

In an associated activity, Branch staff reviewed from an environmental standpoint the proposed revisions to 46 official community plans established in unorganized territories. The revisions were submitted as part of the five-year updating and review process.

Policy Development

The policy development actions of the Branch in 1988/89 could be divided between those involving other jurisdictions and those taking place within the provincial government.

Joint concerns and common strategies

In 1988/89, the Branch helped the Ministry deal with other jurisdictions in two main areas: state-of-the-environment reporting and response to major oil spills.

State-of-the-Environment reporting

The goal of State-of-the-Environment (SOE) reporting is to develop and report publicly on special data series, or "indicators", which over time will accurately represent the most important environmental trends and in effect summarize the "health" of the environment. It is hoped that such indicators, if well selected and widely accepted as indicative, will give the same ready interpretation of the condition of the environment as indicators like the Dow-Jones index or the prime lending rate do for the economy. SOE indicators could therefore be used to stabilize public discussion and to stimulate and evaluate environmental policies.

Development of a national SOE reporting process is a federal initiative supported by British Columbia. In 1988/89, the Planning and Assessment Branch hosted a workshop on SOE reporting for B.C. ministries given by Environment Canada. Subsequently, the Branch successfully encouraged the creation of an interministerial SOE committee as well as an internal Ministry committee to produce a Ministry of Environment SOE report.

Two studies were also conducted during the year. One examined the suitability of the Ministry's reporting systems for generating SOE indicators. The Ministry also cofunded with Environment Canada a contract to produce a regional case study for the forthcoming 1991 National SOE Report.

Response to major oil spills

Early in 1989, two oil spills placed urgent demands on the Ministry. In January, an accident off the United States coast involving the tanker *Nestucca* created an oil slick that came ashore on the west coast of Vancouver Island. Apart from other Ministry actions in response to the spill, the Planning and Assessment Branch was involved in evaluating the impacts in co-operation with Environment Canada and in the creation of the States/British Columbia Task Force on Oil Spills whose task was to develop a system of co-ordinated responses to such emergencies and recommend measures for oil spill prevention.

In March, on the very day of the Task Force's first meeting, came word of the grounding of the tanker Exxon Valdez on the coast of Alaska. Task Force personnel assisted with the cleanup of the spill and learned many lessons. The Task Force was to report by mid-1990 with recommendations for oil spill prevention, new technologies, claims recovery, and joint emergency response.

Policy development within the provincial government

During the year, the Branch participated in several management initiatives within government aimed at long-term objectives:

- *Improved enforcement*

  Branch staff began to prepare a strategy to improve compliance with Ministry permits, licences, and regulations, including more effective enforcement. Meetings were held with regional and program directors to identify problems, and results were presented to Ministry senior management towards year end.

- *Water Management corporate plan*

  Branch staff participated in development of a plan for the Water Management Branch covering basic directions in the management of provincial water resources, including sustainable development of ground water resources, and issues leading to major amendments to the Water Act proposed for 1991.

- *Policy statements*

  The Branch assisted in the preparation and publication of "Sustaining the Living Land", the report of the B.C. Task Force on Environment and Economy, which announced B.C.'s response to the national sustainable development round table initiative. The Branch also made progress on definitive statements of the Ministry's environmental priorities.

- *Reforming environmental appeals*

  Branch staff participated in the reform of appeal procedures before the Environmental Appeal Board to make them fairer and more effectual.

Enforcement and Outdoor Recreational Safety Program

The purpose of the Enforcement and Outdoor Recreational Safety Program is to promote compliance with environmental and outdoor recreational safety legislation. The Program fulfils this purpose in four ways:

- Enforcement: identifying and investigating violations of the law, apprehending violators, and warning, fining, or prosecuting them.
- Protection: responding to threats to public safety or property from dangerous or nuisance wildlife.
- Public education: making contact with hunters, anglers, and other resource users to discuss issues and explain regulations.
- Safety administration: administering licensing and other regulations for safety in river rafting and reviewing applications for safety-related restrictions on boating.

The enforcement function occupies by far the most staff time — more than half the total — with the other three functions in descending order of branch effort as listed.

In 1988/89, the functions of enforcement, protection, and public education were performed by the Conservation Officer Service, with its 108 trained and uniformed officers located throughout the province. The fourth and smallest function, safety administration, was conducted by a few members of branch staff in Victoria.

During the year, in performance of their duties of all kinds Conservation Officers came in contact with nearly 107,000 people. This number was a decrease of 20 per cent below the number of contacts the year before. The reduction was due to three circumstances:

- numerous forest closures due to an extremely dry summer.
- a substantial increase in staff hours devoted to enforcement of waste, water, and pesticide legislation, where case preparation takes far more time than in traditional wildlife and fisheries enforcement.
- an unusually large number of transfers of officers between district offices (with unavoidable time out of service in each case) resulting from an unusual number of early retirements of staff.

Overall, Conservation Officers spent about two-thirds of their time in the field on program duties (enforcement, protection, and public education) and the remaining one-third on office administrative work.

Enforcement

In 1988/89, the Conservation Officers worked to enforce 12 provincial statutes and four federal statutes, including the Criminal Code. A statistical analysis of their activities during the year is presented in the accompanying table.

In interpreting these statistics, two points should be kept in mind:

- This enforcement effort was supplemented by parallel activities of the RCMP. Because RCMP statistics are kept on a different basis, the extent of their actions is not known precisely but is estimated to represent less than 5 per cent in addition.
- The offences identified by Conservation Officers of course represent only a small fraction of all the offences actually committed. From various indicators this fraction is thought to be in the range of 10 per cent.

In 1988/89, Conservation Officers identified more than 5,500 offences and laid more than 3,500 charges, leading to more than 2,700 convictions and fines levied totalling over $360,000. Compared with the year before, this meant charges were down by 6 per cent and convictions were down by 11 per cent (reflecting in part the reduction in total contacts for the reasons given earlier), but fines were up by 8 per cent.

Enforcement of wildlife legislation was the largest single activity of Conservation Officers — 35 per cent of their total time and more than half their field time. More than 23,000 hunters were contacted, and nine out of every 100 hunters checked in the field were charged with violating an Act or regulation. This was a significant improvement on the year before, when the rate was 11 in 100.

In the other prominent areas of enforcement, the most important changes in 1988/89 were as follows:

- the increase in activity in waste management cases, where charges, convictions, and fines rose sharply.

- a smaller increase in pesticide control cases, where charges, warnings, and fines rose substantially, though convictions dropped.
- an overall decrease in fisheries enforcement activity in all categories.
- a noticeable shift away from legal action to issuing warnings in water management cases.

Protection

Through the Conservation Officers, the Program takes action to prevent harm to people or property by problem wildlife.

In 1988/89, compared to the year before, the number of complaints received dropped by more than one-quarter to 5,960, and the proportion of Conservation Officer time spent dealing with these complaints fell accordingly from 13 to 8 per cent.

However, the number of complaints that led to action being taken increased both absolutely and as a proportion of all complaints from 18 to 28 per cent.

Still, among the large predators — bears, cougars, and wolves — fewer were affected than the year before. In particular, far fewer black bears and grizzly bears were destroyed or relocated and many fewer wolves were destroyed. On the other hand, twice as many cougars had to be killed.

Public Education

Apart from dealing with offences and predation after the fact, a vital aspect of Conservation Officer activity is anticipation and prevention through public education.

In 1988/89, Conservation Officers in the field talked with 29,685 hunters and 32,929 anglers, more than 90 per cent of whom were legally enjoying their recreation. These contacts provided direct and immediate opportunities to answer questions and supply information and advice.

In addition, during the year, Conservation Officers talked with 43,955 other persons not hunting or fishing at the time. Many of these people were encountered at the 552 meetings attended by Conservation Officers or at the 458 talks given by Conservation Officers to schools, service clubs, and groups of hunters, fishermen, and naturalists.

In these ways, the community relations program carried out through the 49 district offices continued to nurture public awareness and discussion of issues in conservation and outdoor recreational safety.

Safety Administration

As its name suggests, the Enforcement and Outdoor Recreational Safety Program is responsible for administering a number of safety-related programs. These involve rafting, boating, and all-terrain vehicles.

Rafting

Following twelve fatalities in commercial river rafting in 1987 and the recommendations of a Special Advisory Committee, the Commercial River Rafting Safety Act was promulgated on August 3, 1988. The Act sets regulatory requirements for rafting companies and their operations:

- a permit requirement based on an approved operating plan for each proposed run which adheres to special provisions developed for that run and the hiring of specially licensed guides.
- qualifying criteria, training, and examinations for a guiding licence.
- a system of fines and other penalties for violations.

This new legislation was to be enforced by both Conservation Officers and the RCMP. The requirements were administered by Program staff.

In 1988/89, 28 companies qualified for permits, and 200 guides successfully completed the examinations for licensing.

Boating

The Program administers Boating Restriction Regulations under the Canada Shipping Act on behalf of the federal government as they pertain to British Columbia. These regulations restrict the types of boats and equipment allowed to operate in specified locations on provincial waterways where unsafe conditions exist.

The Program receives and reviews applications from individuals or organizations for additional restrictions. In 1988/89, six new restrictions were approved, bringing to 248 the total number of restricted sections of waterways in the province.

All-terrain vehicles

The tremendous increase in recent years in off-road vehicles such as trail bikes, four wheel drives, dune buggies, and so on has led to growing requests to government for new regulations and tighter controls over their use. In 1988/89, it became apparent that these regulatory requirements extended well beyond the resources of the Enforcement and Outdoor Recreational Safety Program. Discussions within government were therefore held on the transfer of this responsibility to another ministry.

Enforcement of environmental legislation, 1987/88 and 1988/89

Program	Charges	Convictions	Warnings	Fines ($)
Wildlife				
1987/88	1,803	1,491	1,187	186,451
1988/89	1,973	1,438	1,311	178,710
(+/− %)	+9	−4	+10	−4
Fisheries				
1987/88	1,470	1,349	583	114,250
1988/89	1,270	1,018	481	82,615
(+/− %)	−14	−25	−17	−28
Waste management				
1987/88	158	117	102	21,275
1988/89	256	190	82	90,025
(+/− %)	+62	+62	−20	+423
Water management				
1987/88	7	4	5	150
1988/89	2	2	13	200
(+/− %)	−71	−50	+260	+33
Pesticide control				
1987/88	32	27	4	3,350
1988/89	46	35	11	5,100
(+/− %)	+44	+30	+275	+52
Total*				
1987/88	3,510	3,005	1,893	326,476
1988/89	3,584	2,709	1,913	359,015
(+/− %)	+2	−90	+1	+10

NOTE: "Convictions" include "deemed guilty" violations (i.e., uncontested charges) as well as successful prosecutions. "Fines" are amounts levied, rather than amounts subsequently collected.

* Totals also include a small number of unclassified entries.

Public Affairs and Communications

In 1988/89, Information Services became the Public Affairs and Communications Branch. The new name better reflected the Branch's strategic role in program implementation and its ability to deliver a full range of public affairs and environmental education services.

The Public Affairs and Communications Branch provides services to the Ministry which strengthen its links with the public and develop understanding of and support for the Ministry's programs. Central to the Branch's role in the Ministry is providing communications planning: helping the Ministry and individual branches and program administrators develop communications activities to support their program objectives In addition, in 1988/89 the Branch provided services in five broad areas:

- Public consultation: arranging, conducting, and interpreting the results of consultations with special interest groups and the general public on environmental issues involved in Ministry programs and in proposed industrial projects under government review.
- Environmental education: providing educational materials on environmental issues for children and teachers and responding to individual inquiries by teachers, students, and schools.
- Management of communications projects: developing and arranging distribution of brochures, pamphlets, videos, and other materials on environmental issues to the general public, selected audiences, and organizations, as well as publishing technical information and research reports produced by Ministry staff.
- Media relations: using the media to inform the public promptly and accurately about Ministry programs and responding to media inquiries about programs and issues.
- Staff communications: improving communications among Ministry staff and informing them of events, Ministry initiatives, and other matters of background and interest.

The Ministry also operates a library specializing in environmental materials for staff and for the general public.

Public Consultation

In 1988/89, highlights of the Branch's public consultation activities touched on municipal solid waste, Strathcona Park, and peregrine falcons.

Task Force on Municipal Solid Waste

The Task Force on Municipal Solid Waste was appointed in August 1988 and submitted its report in February 1989. The report was based in part on a major public consultation program co-ordinated by Branch staff. Public participation was encouraged by such means as media releases, community newspaper advertising and feature articles, radio and television announcements, media interviews, a Knowledge Network television broadcast, and convention displays.

The consultation followup was extensive. In October and November 1988, 19 public meetings were held in 18 communities across the province. More than 580 people attended the meetings, 71 formal presentations were received, and a great deal of informal discussion took place. During the same period the Task Force held special sessions with local governments, industry, and special interest groups. In all, 61 special sessions occurred in 16 communities.

The public consultation program helped the study in several ways: it ensured a high public profile to Task Force activities, strengthened the informational basis of the 150-page report with its 76 recommendations on all aspects of the issue, and helped prepare a favourable reception of the report by the public.

Strathcona Park newsletter

The multi-faceted and often confusing issues surrounding the proposed master plan for Strathcona Park made it difficult for the public to get a clear picture of the situation. Branch staff themselves developed an eight-page newsletter outlining boundary adjustments, resource tenures, and other planning, ecological, and legal concerns being reviewed by the park's advisory committee.

More than 100,000 copies of the newsletter were inserted into nine Vancouver Island newspapers, and 30,000 were made available to the public through government agencies, constituency offices, and public libraries.

Report on peregrine falcons

The capture of peregrine falcons in the Queen Charlotte Islands for commercial and

recreational purposes had grown to the point that concerns had led to a commission of inquiry. The inquiry produced a report recommending a moratorium on falcon harvests while more research was conducted into the complex ecological interactions in which the falcons were involved. Further communications activities were also planned, such as cosponsorship of a major international conference on seabird ecology and falcon/seabird interactions.

Environmental Education

The focus of environmental education activities in 1988/89 was Project WILD, an interdisciplinary supplementary education program emphasizing wildlife and sponsored in Canada by the Canadian Wildlife Federation. With a primary audience of teachers of kindergarten through high school students, Project WILD was designed to prepare young people for decisions affecting people, wildlife, and the sustainability of the ecosystem. It outlines a vast variety of activities and experiments through which young people in schools can learn basic environmental concepts.

Management of Communications Projects

In 1988/89, a varied multitude of communications projects helped the Ministry implement its programs.

Fact sheets, pamphlets, brochures

Among the many single-issue productions published during the year were the following highlights:

- Fact Sheet on Acid Rain: To keep ahead of requests for detailed information on acid rain, Ministry staff wrote a Fact Sheet intended for university students, environmental groups, and interested members of the public.
- Update on PCBs in Fluorescents: This Fact Sheet explained PCBs, listed the major companies producing fluorescent ballasts containing PCBs, and gave instructions to help determine if particular products contain PCBs. Information was included on removing and storing PCB ballasts, as well as a summary of recent initiatives for developing PCB disposal facilities in the province.
- Water — Never Enough to Waste: A brochure outlining water conservation methods for home, garden and agricultural use was developed as part of a program to deal with water shortages in the Okanagan. The brochure applied to any location in the province experiencing water shortages.
- Special Waste Legislation Guide: To assist the implementation of the complex new special waste legislation, this guide gave a comprehensive overview of the issues and the regulations. Explaining such matters as how to determine when a waste is special waste, how it should be transported, and what secure landfill and long-term storage require, the guide was intended to act as a work of reference for industry and a training manual for regional waste management staff.
- Rafting Safety Cards: These information cards to be distributed to consumers by rafting guides and Ministry of Tourism offices explained the new white-water rafting regulations, which assured that guides were properly qualified and rafters prepared.
- Game Farming in British Columbia: Based on the recommendations of the British Columbia Game Farming Advisory Council, this brochure explained to the public what game farming is and what is being done to prevent harmful cross-breeding, displacement of existing wildlife populations, and the spread of disease and parasites.

Video

During the year, the Branch made available to B.C. viewers of the Knowledge Network the popular Ontario Ministry of Energy video "The Conserving Kingdom", which has proved entertaining and informative for students from Grade 3 to high school.

Portable displays

To help in activities to publicize Ministry programs, in 1988/89 new, easily assembled, portable display kits were developed. Allowing large graphic elements and a minimum of text, the displays were suitable for use on their own or as a colourful backdrop to other exhibits.

Joint publishing of hunting and fishing regulations

These high-volume annual publications acquired a new look in 1988/89 when they

were published for the first time jointly by the Ministry and B.C. Outdoors Magazine, a Maclean-Hunter publication. In attractive redesigned formats, and with advertising sales offsetting production costs, the publications were made widely available free of charge.

Environmental awards for 1989

As in previous years, the Minister of Environment presented environmental awards in five categories to individuals and organizations in British Columbia in honour of their achievements in environmental matters. The awards were as follows:

- *Oil spill cleanup volunteers (individual citizen)*

  These volunteers helped remove oil and debris from Vancouver Island beaches following a spill from a bunker oil barge off Washington State.

- *Spruce City Wildlife Association (citizens' group)*

  Now in its 20th year, this association, whose members include hunters, anglers, naturalists, trappers, guides, and environmentalists, has an enviable record of fish and wildlife enhancement projects, environmental education, and assistance in reducing poaching.

- *City of Kelowna and Regional District of Central Okanagan (government agency)*

  The City and Regional district played a major role in creating the Mission Creek kokanee spawning channel and both officially proclaimed Sept 19-25 Fisheries Awareness Week.

- *New Science Program (environmental education)*

  This CHEK television program has raised public awareness of the environment and provided comprehensive treatment of environmental issues and concerns.

- *Tahltan Nation Development Corporation and Tahltan Tribal Council (business)*

  These groups co-ordinated an environmentally sound agreement between the Tahltans and Golden Bear Mining, one that balances mining development with significant protection for grizzlies, moose, and salmon.

- *B.C. Telephone Company (business)*

  In completing the Lightguide fibre-optic cable project, company personnel took great pains to ensure adequate fish and wildlife protection at every stream and river crossing in 770 kilometres of cable length. The company, its contractors, and employees set a new environmental protection standard for such projects.

Media Relations

In 1988/89, as in previous years, the Branch's traditional media relations activities occupied more staff time than any other function. These activities included talking to reporters — providing program news and background context and finding answers to their questions — writing and distributing press releases, arranging and hosting news conferences, scanning stories, and summarizing media queries and opinions for Ministry staff. The growth of these activities, even while the Branch diversified its own functions, reflected the rising level of public concern for the environment and for the government's role in protecting it.

Staff Communications

Among the Branch's wider responsibilities was the improvement of communications among Ministry staff by publishing the Ministry newsletter, Environment News. In 1988/89, Environment News began to publish six issues a year, covering staff activities and personalities, reporting personnel and staff development news, and giving concise explanations of major Ministry initiatives and policy announcements.

Environmental Appeal Board

The Environmental Appeal Board functions under the provisions of the Environment Management Act (1981); its purpose is to hear appeals to decisions made under environmental legislation. The board, appointed by Cabinet, consists of a chairman and a sufficient number of board members to deal with appeals expeditiously. During the period covered by this report (1988), there were 24 board members, including the Chairman.

In 1988, 63 licenses, permits or orders of the Director of Waste Management, the Director of Wildlife, the Comptroller of Water Rights, and the Administrator of the Pesticide Control Act were appealed, compared to 70 the previous year. The Board, usually in Panels of three, conducted 18 hearings to hear the appeals of 46 appellants, many of whom appealed more than one permit. Many appeals were abandoned, usually because of the successful resolution of concerns that lead to their appeal.

One application was made to the Lieutenant Governor in Council to overturn the decision of the Board. One applicant was successful.

The following is a breakdown of the results of appeals conducted in 1988:

Pesticide Control Branch

Number of Appeals	35
Appeals Upheld	0
Appeals Dismissed	8
Appeals Abandoned or Withdrawn	25
Appeals Rejected	1
Permits Cancelled (by Administrator before hearing)	1

Waste Management Branch

Number of Appeals	14
Appeals Upheld	0
Appeals Dismissed	11
Appeals Abandoned or Withdrawn	0
Appeals Rejected	1
Orders Cancelled	2

Water Management Branch

Number of Appeals	9
Appeals Upheld	2
Appeals Dismissed	6
Appeals Abandoned or Withdrawn	1
Appeals Rejected	0
Orders Cancelled	0

Wildlife Branch

Number of Appeals (partially)	5
Appeals Upheld	1
Appeals Dismissed	2
Appeals Abandoned or Withdrawn	0
Appeals Rejected	2
Appeals Cancelled	0

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